85-5509/

The Institute for Research on Public Policy
L'Institut de recherches politiques

A national, independent, research organization
Un organisme de recherche national et indépendant

Founded in 1972, The Institute for Research on Public Policy is a national organization whose independence and autonomy are ensured by the revenues of an endowment fund which is supported by the federal and provincial governments and by the private sector. In addition, the Institute receives grants and contracts from governments, corporations and foundations to carry out specific research projects.

The *raison d'être* of the Institute is threefold:

- To act as a catalyst within the national community by helping to facilitate informed public debate on issues of major public interest
- To stimulate participation by all segments of the national community in the process that leads to public policy making
- To find practical solutions to important public policy problems, thus aiding in the development of sound public policies.

The Institute is governed by a Board of Directors, which is the decision-making body, and a Council of Trustees, which advises the Board on matters related to the research direction of the Institute. Day-to-day administration of the Institute's policies, programs and staff is the responsibility of the president.

The Institute operates in a decentralized way, employing researchers located across Canada. This ensures that research undertaken will include contributions from all regions of the country.

Wherever possible, the Institute will try to promote public understanding of, and discussion on, issues of national importance, with clarity and impartiality. Conclusions or recommendations in the Institute's publications are solely those of the author and should not be attributed to the Board of Directors, Council of Trustees, or contributors to the Institute.

The president bears final responsibility for the decision to publish a manuscript under the Institute's imprint. In reaching this decision, he is advised on the accuracy and objectivity of a manuscript by both Institute staff and outside reviewers. Publication of a manuscript signifies that it is deemed to be a competent treatment of a subject worthy of public consideration.

Publications of the Institute are published in the language of the author, along with an executive summary in both of Canada's official languages.

COMPUTER COMMUNICATIONS AND THE MASS MARKET IN CANADA

COMPUTER COMMUNICATIONS AND THE MASS MARKET IN CANADA

Barry Lesser
Louis Vagianos

The Institute for Research on Public Policy/
L'Institut de recherches politiques

Copyright © The Institute for Research on Public Policy 1985
All rights reserved

Printed in Canada

Legal Deposit Second Quarter
Bibliothèque nationale du Québec

Canadian Cataloguing in Publication Data

Lesser, Barry, 1947-

Computer communications and the
mass market in Canada

Foreword and summary in English and French.
ISBN 0-88645-022-5

1. Computer industry—Canada. 2. Computer networks.
3. Market surveys—Canada. I. Vagianos, Louis, 1935-
II. Institute for Research on Public Policy
III. Title.

HD9696.C63C355 1985 C85-090133-2 381'.4500164404'0971

The Institute for Research on Public Policy/
L'institut de recherches politiques
2149 Mackay Street, Suite 102
Montreal, Quebec H3G 2J2

CONTENTS

Foreword	vii
Avant-propos	ix
Summary	xi
Abrégé	xvii
Acknowledgements	xxiii
1: Introduction	1
Notes	4
2: A Taxonomy of Service Offerings	7
Some Alternative Classifications	8
One-way vs. Two-way Systems	16
User Capabilities	21
A Preliminary Taxonomy	23
A Final Taxonomy	26
Notes	33
3: Demand Analysis	37
A Review of Existing Forecasts	37
Demand Models	40
Applying the Lancaster Model	43
Relevant Characteristics	44
Cost Considerations	55
Other Characteristics	62
Market Characteristics	65

Conclusion	67
Notes	68
4: Supply Determinants	75
Hardware	75
Competition	77
Market Integration	80
Financing	84
Pricing	87
Packaging, Content and Marketing	89
Carrier Options	90
Conclusion	94
Notes	94
5: Scenarios of Market Development	99
Some Existing Scenarios	99
A List of Options	104
Some Further Conclusions	108
A General Scenario	112
Conclusion	113
Notes	114
6: Government Policy and the Role of Government	117
Government Subsidies	118
Regulation	121
Other Policies	122
Direct Government Benefits	123
Social/Economic Goals	124
Conclusion	129
Notes	131
Appendix A: Defining the Mass Market	133
A Review of the Literature	133
Interview Responses	140
A Summary of Views	143
Definition	148
Notes	149
The Members of the Institute	153
Institute Management	155
Publications Available	157

FOREWORD

This is the eighteenth study the Institute has published in the fields of communications and computer technology. Some, such as Issues in Canadian/US Transborder Computer Data Flows, Memo From Mercury, Women and the Chip, Telecommunications Regulation and the Constitution, were published at particularly opportune times and became an integral part of the public discussion of the issues involved. Others, such as Regulatory Reform in Canada, Les Micro-Esclaves : Vers une bio-industrie Canadienne, Cultural Regulation in Canada, The Introduction of Pay-TV in Canada: Issues and Implications, though less visible in the public debate, contributed important data. If the reviewers are correct, Computer-Communications and the Mass Market in Canada could prove to be a combination. As one reviewer noted, the authors venture into largely virgin territory, and the task they set for themselves in identifying and assessing the market forces involved in the development of a mass-market is enormous. To gauge its enormity, it suffices to look at the review of past (but still recent) videotext market forecasts found in Chapter Three.

The importance of this study rests on the premise that the driving force of the much-heralded information age is computer-communications technology, a technology which is destined to bring about revolutionary changes to all aspects of society and human endeavour. For these changes to occur properly in Canada, widespread

usage of the technology must be achieved. This will require the development of a mass market. What is unclear is how such a mass market can develop, who will participate, under what terms and for whose benefit. What is clear, if the argument of this document is accepted, is that governments must play the key role in balancing the interplay between the forces of competition and government intervention.

In their introduction the authors note computer-communications technology is a transforming technology. As such it could transform Canada as dramatically as railroads did a century earlier. By providing a network of connective arteries, railroads became the symbol for binding the country, and permitted extraordinary growth and prosperity. Computer-communications technology holds a similar promise because it can provide (even more easily than the railroad) a greatly enhanced network of possible linkages, including those in remote centres. Yet to gain the maximum benefits from its potential impact will require wise decisions as to how the technology is to be developed and implemented. Such decisions will require discussion of the issues and involvement among all groups, particularly many not normally involved in governmental processes.

The Institute recognizes the importance of these potentially controversial issues and is committed to remaining a major participant in the public debate as the information age unfolds. At present four additional studies are in varying stages of completion and a wide range of new research is being considered. We hope that these activities, along with the present document, will serve the purpose emphasized above, to involve all those affected by the present technological developments in a wide-ranging debate as to their consequences and the means to harness them.

A.R. Dobell
President

April 1985

AVANT-PROPOS

Il s'agit là de la dix-huitième étude que publie l'Institut dans le domaine des communications et de l'informatique. Certains, comme Issues in Canadian/US Transborder Computer Data Flows, Memo from Mercury, Women and the Chip, Telecommunications Regulation and the Constitution, ont paru à point nommé et ont profondément influencé la discussion des problèmes en question. D'autres, telles que Regulatory Reform in Canada, Les Micro-Esclaves : Vers une bio-industrie canadienne, Cultural Regulation in Canada, The Introduction of Pay-TV in Canada: Issues and Implications, ont sans doute joué un rôle plus effacé dans le débat public, mais se sont révélées une précieuse source de données. Or, si l'opinion des lecteurs est justifiée, Computer-Communications and the Mass Market in Canada pourrait bien remplir cette double fonction. Comme l'a noté l'un d'entre eux, les auteurs se sont aventurés dans des domaines encore peu explorés. Ainsi, l'identification et l'analyse des forces qui entrent en jeu dans le développement d'un marché de masse est la tâche simplement gigantesque qu'ils se sont fixée. Pour en juger, il suffit d'examiner la revue des prévisions du marché vidéotex, passées (quoique relativement récentes), figurant au chapitre III.

L'importance de cette étude repose sur l'idée que la force motrice de la célèbre ére de l'information est la téléinformatique, laquelle semble destinée à révolutionner tous les aspects de l'activité et de la

société humaines. Or, pour que de tels changements puissent intervenir normalement au Canada, il importe que l'usage de cette technologie se répande largement, d'où la nécessité de créer un marché de masse. Il reste toutefois à déterminer de quelle façon et sous quelles conditions un tel marché peut se développer et, en outre, quels en seront les participants et les bénéficiaires. En revanche, si l'on en croit les auteurs, il est déjà clair que les gouvernements devront être au premier plan pour équilibrer les forces concurrentielles et l'intervention de l'État.

Dans leur introduction, les auteurs font remarquer que la téléinformatique est une technologie en pleine transformation. Partant, elle pourrait modifier le visage du Canada aussi radicalement que ne l'a fait le chemin de fer un siècle plus tôt. En effet, grâce à l'installation d'un réseau de voies reliées, celui-ci s'est fait le symbole de l'unification du pays et a été une source de croissance et de prospérité extraordinaires. La téléinformatique apparaît tout aussi prometteuse, car elle permet d'envisager (encore plus que le chemin de fer) l'implantation d'un réseau vastement élargi et susceptible de desservir les centres les plus éloignés. Toutefois, afin de profiter pleinement des effets éventuels de cette technologie, il faudra prendre les décisions qui s'imposent concernant son développement et son application. Il sera donc impératif de favoriser un débat sur les problèmes en question et sur la participation de tous les groupes concernés, et notamment de ceux qui n'ont normalement aucune prise sur les processus gouvernementaux.

L'Institut est conscient de l'importance de toutes ces questions controversées et réaffirme son intention de prendre part activement au débat public au fur et à mesure qu'évolue l'ère de l'information. Ainsi, quatre autres études en sont à diverses étapes de réalisation et toute une gamme de nouveaux sujets de recherche sont présentement à l'étude. Nous espérons que de telles activités, ainsi que le présent document, nous aideront à atteindre notre objectif, à savoir la participation de tous ceux que touchent les innovations techniques actuelles à un débat de haute portée sur les répercussions de ces innovations et sur les moyens de les maîtriser.

SUMMARY

Computer-communications services allegedly shall herald the new information age, an age which will witness revolutionary changes in all aspects of society and human endeavour. However, despite the predictions of revolutionary changes and despite the present availability of the technology, there has, to date, been relatively little success in introducing computer-communications services for the general public. A very pragmatic question remains to be answered. "What factors will determine the development of computer-communications services for the mass consumer market in Canada?"

For purposes of this study, computer-communications services are defined as services which involve the combined use of computers and electronic communications for the remote delivery of computerized data bases and/or the direct interaction of an end-user with a computer situated elsewhere. The mass consumer market is defined in terms of four criteria: widespread usage; the use of computer based information/content and remote direct access via an electronic communications medium; availability to the general public, even if the immediate target audience is a sub-group of the general public; and all classes of users, i.e., residential, business, government and actual or potential users.

Based on this definition of the mass consumer market for computer-communications services, a taxonomy of service offerings is

developed. Three major classification schemes are superimposed on one another in the final taxonomy presented:

- a functional classification where a five-fold breakdown consisting of information retrieval, transactions, messaging, computing and monitoring is used;
- a level of interaction classification which involves a two-way categorization between interactive services, i.e., services which directly provide some level of processing capability by the user other than selection of pre-packaged content and consumptive services, i.e., services which provide no user processing capability other than possibly the selection of pre-packaged content;
- a user, or human, capabilities classification which uses a three-way categorization, amplification of cognition, regulation of affect and communication/control, to describe the way in which computer/communications services will impact on human capabilities.

A number of conclusions emerge from the taxonomy of service offerings developed from the combination of these three different, yet related, classification schemes. In terms of services already existing or under active consideration for introduction, information retrieval/amplification of cognition shows the greatest number of entries. Second, consumptive systems, though capable of delivering a great many information retrieval services, cannot be used directly for messaging or computing services, have very limited use for transactions and monitoring services, and are more limited, less rich, for information retrieval purposes than the equivalent content provided by an interactive service. Finally, consumptive services relate overwhelmingly to cognitive abilities while interactive services, proportionately, influence regulation of affect and communication/control to a greater degree.

The taxonomy, by itself, is recognized to be of only limited value since it examines needs and user impact purely in a technical sense of capabilities. It does not take into account economic or social factors, both of which, ultimately, will dictate market acceptance and market development.

In this regard the study proceeds to examine and analyze factors

on both the demand side and the supply side of the potential mass market likely to influence the emergence and the timing of the emergence of the actual mass market.

On the demand side, a Lancaster demand model is employed to analyze the characteristics of computer-communications services. This demand model emphasizes the characteristics which computer-communications services offer the consumer rather than the services themselves which are the focus of the standard demand paradigm. Such a model, it is argued, is far richer for analyzing the probable demand for new goods and services where most of the attributes designated by the new services are available, though in different proportions or different bundles, from existing goods and services.

The cost of computer-communications services is shown to be significant, particularly when all cost elements, such as hardware costs, service costs, communication costs and time costs, are considered. On the hardware side, terminal equipment dedicated to a particular service will retard market growth by adding to costs. Use of a standardized, intelligent, programmable terminal device, such as a personal computer, will, on the other hand, lower the cost of computer-communications services at the margin and, thereby, enhance market growth. Regarding the price of services, flat rate, unlimited usage, subscription fees, seem to be the favoured residential-user pricing scheme at the present time. This scheme may change, however, as the number of available service offerings increases. Low prices, per se, are seen to be important, all other things being equal, but the price levels which the market will tolerate must always be studied in relation to the value of the service. Low prices are not a necessary condition for a mass market.

Several other conclusions emerge from the demand analysis: the personalized/customized service characteristic which can be offered by computer-communications services may be one of its major advantages; the introduction of local measured service (LMS) for telephone pricing could discourage development of mass market computer-communications services; the value of graphics and colour capability to the market acceptance of computer-communications services is questionable; transactions services offer some of the potentially highest

value characteristics among alternative computer-communications service offerings; potential congestion of telephone-based delivery systems could reduce the reliability of the service, a result which users would not value; and user preferences, including levels of satisfaction with existing goods and services offering many of the same characteristics as computer-communications services, will play a large role in the ultimate success of mass market computer-communications services.

The supply analysis focuses on a number of specific issues: hardware options/choices; service packaging/content; financing; pricing; competition/market structure; marketing; and carrier options. Several important conclusions are generated, including the following: overall market development will be best served by one all-purpose terminal with which users can access any service of their choice; the personal computer offers major advantages as the standard terminal device for the market; competition in the market will benefit long run market development; the major problem for achieving a mass market lies in finding a valid product, something which competition on the supply side of the market is more likely to promote; the traditional content/carriage separation to which telephony carriers have been subject should be maintained in the computer-communications field and applied to all carriers, not just the telephone companies, but, subject to certain qualifications, should not be taken to preclude carrier-operated gateway systems; content/service provider separation may be desirable but cannot or should not be extended to service provider control, for content-successful marketing requires service provider control over content; general advertising is not likely to be as important a source of financing for computer-communications services as is commonly assumed, although specific advertising tied to transactions-related services may be significant; government subsidization could help promote mass market systems but could also create economically unjustified systems and distort market development; a tiered-pricing system, combining elements of flat rate and usage sensitive pricing, is likely to serve producer's interests best; and marketing efforts should concentrate on identifying appropriate audience group or target market segments and on delivering products which respond to the perceived

needs of the various target groups. Finally, some of the relative merits of cable and telephony distribution systems are discussed.

Putting together the demand and supply analyses, several scenarios of market development in the medium term are examined. By combining different elements of these various scenarios, the suggested preferred market development scenario recommends non-exclusivity of production technologies and distribution channels, convergence of the terminal market around the personal computer, recognition of content rather than hardware as the primary basis of the market, emphasis on transactions and messaging services as the primary functional applications of the market, gateway facilities to re-enforce the universality of networks, focused applications directed at identifiable market segments and emphasizing high-value content, initial focus on business applications, tiered-content and tiered-price structures, and financing arrangements which draw on both information-provider revenues and user charges.

How quickly the market develops will depend on how quickly this shape emerges. No quantitative demand forecasts are offered since the likelihood and the time of the emergence of this preferred shape are too uncertain for such an exercise.

The study concludes with an examination of the role of government and of government policy. Subsidy programs are seen as short-term measures only and subject always to a firm justification of the subsidy in cost-benefit terms. The discussion of regulation of the industry by government notes that if regulation is to occur the rules of the game must be known and regulatory delay should not be allowed to retard market development. Direct financial benefits to government from participation in the computer-communications services market are also examined.

Finally, the social/economic policy goals of government as they relate to computer-communications service are reviewed. Government to date has not officially stated or priorized its goals for this sector; however, various possible aims, gleaned from statements by senior public officials, relative to the goal of maximizing market development are explored. The analysis demonstrates clearly that the objectives of government could have a major influence on the development of mass

market computer-communications services. The preferred market development scenario sketched earlier can be reconciled with the various potential policy goals of government if those goals are interpreted in particular ways. Interpreted differently, however, market development will be retarded and/or distorted. If this consequence is to be avoided, the valid social objectives of government policy must be clearly and realistically spelled out. Services, such as content and applications, not hardware, are what matter both in terms of market development and social objectives. Services are what must concern industry, consumers and government alike.

ABRÉGÉ

Les services de communication informatique, ou télématique, sont censés ouvrir l'âge de l'information et apporter des changements révolutionnaires dans tous les aspects de la société et de l'activité humaine. Toutefois, malgré ces pronostics et l'état avancé des techniques à l'heure actuelle, on n'a pu observer jusqu'à présent qu'un succès relativement limité dans l'introduction des services télématiques pour le grand public. Il se pose une question d'ordre pratique, savoir " quels sont les facteurs qui vont déterminer le développement des services télématiques pour le marché de masse au Canada? "

Pour les besoins de la présente étude, on définit les services télématiques comme étant ceux qui font intervenir l'utilisation combinée des ordinateurs et des systèmes de communication électroniques, pour donner accès à distance aux banques de données informatisées, ou pour permettre l'interaction directe d'un usager avec un ordinateur éloigné. Le marché de consommation de masse se définit selon quatre critères : usage généralisé; utilisation de contenu d'information établi sur ordinateur directement accessible à distance au moyen d'un système de communication électronique; accès offert à l'ensemble du public, même si la cible immédiate est constituée par un groupe plus restreint; et finalement, ouverture à toutes les classes d'usagers, savoir résidentiels, affaires, gouvernement, avec usage tant réel que potentiel.

Sur la base de cette définition du marché de consommation de masse pour les services télématiques, on établit une taxinomie des services offerts. On combine trois principes de classification pour obtenir la taxinomie finale :

- classification fonctionnelle, avec une subdivision en cinq catégories, savoir dépistage de l'information, transactions, messages, calcul et surveillance;
- classification par niveau d'interaction avec subdivision en deux catégories, savoir services interactifs, offrant à l'usager des possibilités de traitement direct autre que la sélection de contenus tout préparés, et services de consommation, qui n'offrent aucune possibilité de traitement direct sauf le choix de contenus tout préparés.
- classification par type de capacité humaine, décrivant l'impact des services télématiques en trois catégories : amplification de la cognition, régulation affective et communication/contrôle.

La combinaison de ces trois principes de classification distincts mais interconnectés produit une catégorisation des services offerts qui permet de tirer un certain nombre de conclusions. Premièrement, le plus grand nombre parmi les services déjà en place et ceux qui sont en consideration concernant les catégories dépistage de l'information et amplification de la cognition. Deuxièmement, les systèmes de consommation, bien qu'ils puissent offrir des possibilités considérables de dépistage d'information, ne peuvent servir directement pour fins de message ou de calcul; ils offrent des possibilités très limitées de services de transaction et de surveillance, et, quant au dépistage de l'information, ils sont plus limités et moins riches que les services de contenu équivalent en mode interactif. Finalement, les services de consommation concernent principalement les capacités cognitives, alors que les services interactifs, en proportion, ont une plus grande influence sur la régulation affective et la catégorie communication/contrôle.

On reconnaît que cette taxinomie en elle-même a une valeur limitée, étant donné qu'elle n'examine les besoins et l'incidence sur les usagers que du point de vue de l'aspect technique des capacités. Cette taxinomie ne tient pas compte des facteurs économiques ou sociaux qui en définitive auront une incidence fondamentale sur l'acceptation et l'exploitation du marché.

Sur ce point, l'étude passe à l'examen et à l'analyse des facteurs dans les marchés de masse possibles, tant du côté de l'offre que du côté de la demande, qui pourraient d'influencer l'émergence et l'échéancier du marché de masse réel.

Du côté de la demande, on utilise un modèle de type Lancaster, pour analyser les caractéristiques des services télématiques. Ce modèle de la demande met l'accent sur les caractéristiques offertes aux consommateurs par les services de télématique, plutôt que sur les services eux-mêmes, qui constituent la visée principale du modèle de demande standard. On suggère qu'un tel modèle offre une plus grande richesse pour l'analyse des probabilités de demande de biens et services nouveaux, dans les cas où la plupart des propriétés des nouveaux services sont disponibles, bien que dans des proportions et dans des assemblages différents, au moyen de biens et services actuels.

L'étude démontre l'importance du coût des services télématiques, particulièrement si l'on prend en considération tous ses éléments, savoir matériel, service, communication et temps. En ce qui concerne le matériel, l'utilisation d'équipement terminal spécialisé pour un service particulier aura tendance à retarder la croissance du marché, en introduisant des coûts supplémentaires. Par contre, l'utilisation d'un appareil terminal standard, intelligent et programmable, par exemple un ordinateur personnel, aura tendance à réduire le coût marginal des services télématiques, et par conséquent à stimuler la croissance du marché. Quant au prix des services, on semble favoriser à l'heure actuelle un système de facturation de l'usager par abonnement à taux unitaire et utilisation illimitée. Toutefois, ce système pourrait changer au fur et à mesure de l'expansion des services offerts. On constate l'importance d'un tarif économique toutes choses égales d'ailleurs, mais il y a toujours lieu d'étudier les niveaux de prix acceptables pour le marché en rapport avec la valeur des services offerts. La faiblesse des tarifs n'est pas une condition nécessaire à la création d'un marché de masse.

L'analyse de la demande donne lieu à plusieurs autres conclusions : un des avantages principaux de la télématique pourrait bien être la personnalisation du service qu'elle permet; l'introduction du " service local tarifé " (SLT) pour le réseau téléphonique aurait tendance à

décourager le développement des services de télématique de masse; il est douteux que les capacités graphiques et de couleur contribuent à l'acceptation des services télématiques sur le marché; parmi les services possibles en télématique, les caractéristiques potentiellement les plus précieuses sont celles des services de transaction; il se pourrait que la congestion des services téléphoniques nène à réduire la fiabilité du service, ce que les usagers n'apprécieraient pas; et finalement, les préférences des usagers, entre autres le niveau de satisfaction assuré par les biens et services en place qui offrent déjà plusieurs des caractéristiques des services de télématique, auront un grand rôle à jouer dans la réussite finale des services de télématique de masse.

L'analyse de l'offre se concentre sur un certain nombre de questions spécifiques : choix de matériel; présentation et contenu des services; financement; tarifs; structure du marché et de la concurrence; commercialisation; et modes possibles de transmission. Il en découle plusieurs conclusions importantes, dont les suivantes : le développement du marché global bénéficierait de l'utilisation d'un terminal banalisé donnant aux usagers accès à tous les services désirés; l'ordinateur personnel offre des avantages importants comme appareil terminal standard sur le marché; une situation de concurrence aura des avantages à long terme pour le développement du marché; le problème principal dans la réalisation d'un marché de masse consiste à trouver un produit valable, savoir un produit qui bénéficierait de la concurrence du côté de l'offre; la séparation entre transmission et contenu traditionnellement imposée aux compagnies de transmission téléphonique devrait être maintenue dans le domaine des communications informatiques, et appliquée non seulement aux compagnies de téléphone mais à toutes les compagnies de transmission; par contre, sous certaines réserves, cette séparation ne devrait pas exclure l'exploitation de systèmes d'interface (" gateways ") par les compagnies de transmission; il peut être désirable d'assurer une séparation entre le contenu et les prestations de service. Mais il n'y a pas lieu de pousser cette séparation jusqu'à contrôler les prestateurs de service, dans la mesure où la réussite de la commercialisation dans le domaine du contenu exige que les prestateurs de service aient le contrôle du contenu; il est peu probable que les recettes publicitaires non spécialisées constituent pour les services

télématiques une source de financement aussi importante qu'on ne le suppose généralement; par contre, la publicité spécifique concernant les services de transaction peut avoir un rôle important à jouer; des subventions gouvernementales pourraient contribuer à la promotion de systèmes de télématique de masse, mais pourraient aussi mener à la création de systèmes sans justification économique, et à une distorsion du développement du marché; les intérêts des producteurs seraient probablement servis au mieux par un système de tarifs à plusieurs niveaux, combinant certains éléments de tarif unique et de tarif selon l'usage; il y a lieu de concentrer les efforts de commercialisation sur l'identification de groupes de clients ou de secteurs cibles appropriés, et sur la livraison de produits accordés aux besoins perçus par les divers groupes cibles. Finalement, l'étude examine certains des avantages relatifs de systèmes de distribution téléphonique et par câble.

La combinaison des analyses de demande et d'offre permet d'examiner divers scénarios de développement du marché à moyen terme. La combinaison de divers éléments de ces scénarios mène à un scénario idéal suggéré dans l'étude, avec les recommandations suivantes : éviter l'exclusivité dans les techniques de production et les systèmes de distribution; regrouper le marché des terminaux sur l'ordinateur personnel; reconnaître que la base fondamentale du marché est constituée par le contenu et non par le matériel; appuyer sur le fait que les services de transaction et de message constituent les applications fonctionnelles principales du marché; établir des installations d'interface pour renforcer l'universalité des réseaux; mettre au point des applications concentrées, orientées vers les secteurs identifiables du marché, avec un contenu de grande valeur; concentration initiale sur les applications d'affaires, avec des structures de contenu et de prix à plusieurs niveaux, et des dispositifs de financement portant à la fois sur les recettes des fournisseurs d'information et sur la facturation aux usagers.

La vitesse de développement du marché dépendra du temps qu'il faudra pour que ce scénario s'impose. On n'offre pas de prévisions quantitatives de la demande, vu l'incertitude sur la forme du marché et le temps de son émergence.

En conclusion, l'étude examine le rôle du gouvernement et de ses politiques. On n'envisage de programmes de subvention qu'à court terme, et uniquement dans la mesure où ils se justifient fermement par une analyse coûts/bénéfices. Quant à la réglementation gouvernementale de l'industrie : s'il doit y avoir régulation, il est essentiel de connaître les règles du jeu, et de ne pas laisser les retards dans la réglementation ralentir le développement du marché. L'étude examine également les avantages financiers directs que le gouvernement pourrait tirer d'une participation au marché de la télématique.

Finalement, on examine les objectifs du gouvernement en matière de politique socio-économique, dans leurs rapports avec les services de télématique. Jusqu'à date, le gouvernement n'a pas officiellement déclaré ses objectifs et priorités dans ce secteur; toutefois, l'étude explore divers objectifs possibles, glanés parmi les déclarations de divers hauts fonctionnaires, concernant la maximisation du développement du marché. L'analyse présentée montre clairement que les objectifs du gouvernement pourraient avoir une incidence majeure sur le développement du marché des services télématiques. Il est possible de reconcilier le scénario préférable de développement du marché, mentionné ci-dessus, avec les divers objectifs possibles des politiques gouvernementales, si l'on interprète ces objectifs d'une certaine manière. Par contre, dans une autre interprétation, ces objectifs pourraient causer un retard ou une distorsion du développement du marché. Si l'on désire éviter cette conséquence, il est essentiel de spécifier clairement et de manière réaliste les objectifs sociaux de la politique gouvernementale. Ce sont les services, savoir contenu et application, et non le matériel, qui ont de l'importance tant pour le développement du marché que pour les objectifs sociaux. Ce sont les services qui doivent rester au centre des préoccupations de l'industrie, des consommateurs et du gouvernement.

ACKNOWLEDGEMENTS

This study was undertaken in association with Dalhousie University under a University Research Grant from the Department of Communications, Government of Canada, during the 1983 fiscal year. The authors wish to express their thanks to DOC and, in particular, to Dr. P. Neogi, scientific authority for the project.

A number of persons gave freely of their time and expertise in assisting the conduct of this study: P. Lowry of A.T.&T.; D. Hughes, J. Schram, F. Sum, P. White and B. Wilson of Bell Canada; David Carlyle of Carlyle Videotex Consultants; R. Allan and O. Stubits of CN/CP Telecommunications; M. Fenner of CompuServe; C. Bowness and M. Fox of The Financial Post; C. Houston, S. Matheson and C.T. Taylor of GTE Telenet; D. MacCallum of Infomart; R. Kuhn of McGraw-Hill; A. Chitnis of NABU; T. Bearman of NCLIS; R. Duchesne of the National Library of Canada; M. Bendig and T. Harnish of OCLC; P. Bowers and C. Hurley of OECA; K. Shea of Rogers Cablesystems; I. Sharp of Ian Sharp Associates; N. Beckman of The Source; and P. Gross of Time Inc. To these individuals and others who assisted us in various ways, we express our sincere appreciation and our hope that none will feel their views have been misrepresented.

Finally, we wish to thank Anne Shaw and Virginia LeBlanc for their administrative and secretarial assistance and John Howard Oxley for his assistance in undertaking a literature search.

1: INTRODUCTION

Computer-communications technology, we are told, will transform our society. The post-industrial society or the information age is heralded as part of a revolution which will profoundly influence all aspects of human endeavour:

> Out of this widespread availability of information power, there will flow social changes and opportunities for human development that promise to make the next few decades among the most critical that mankind has ever faced.[1]

But, the "widespread availability of information power," alone, will not bring about changes and opportunities. The availability of the power represents only the machines, and machines are means, not ends. Widespread and appropriate usage of information power must be achieved if the potential benefits of this technology are to be realized.

The purpose of this study does not permit specific discussion of issues involved in the appropriate use of technology, for that discussion would introduce too many other variables, the major one involving the concept of information itself. Instead, this analysis will be concerned with the widespread usage of computer-communications services.

By computer-communications services, we mean services involving the combined use of computers and electronic communications for the remote delivery of computerized data bases and/or the connection of an end-user with a computer situated elsewhere. More precisely, this study examines and analyzes the factors likely to

influence the development of computer-communications services for the mass consumer market in Canada.

The mass consumer market, as the term is used here, is defined by four criteria: widespread usage; use of computer-based information/content and remote direct access via an electronic communications medium; availability of the service to the general public, even if the immediate target audience is a sub-group of the general public; and all classes of users—residential, business, government, and both actual and potential users.

The framework of analysis which the study employs applies to all computer-communication services, for the framework offers an integrated view of the information market. The study concentrates primarily on the mass consumer market to limit the scope of the analysis and to emphasize the fact that the two key characteristics of the mass consumer market, widespread usage and availability to the general public, must be achieved if the information age is to become a reality. In other words, the focus of this study on the mass consumer market represents an ex post application of our framework to a particular, potentially large, segment of the total market to which the framework can be applied and singles out for attention that the revolutionary potential of computer-communication services ultimately depends on services achieving widespread usage and being available to the public at large.

Appendix A discusses in some detail the concept of the mass consumer market for computer communications and rationalizes the particular definition of that market segment which is used here. It clarifies both the relevance of the mass market to the emergence of the information age and the considerable ambiguity and confusion which surrounds the use of the term by many observers.

To draw a distinction between the machines of the information age and their use and observe that the former, alone, are not sufficient for the impact that is forecast is not particularly original. But, this point seems to be ignored sometimes. It is not that observers fail to realize that the machines must be used to be useful but that they fail to realize that simply having the machines available does not guarantee their use:

> . . . the question is not a technical one but an economic one. It is not the technical feasibility of most of the applications we have described, but the economic capability to take advantage of them . . .[2]

Although this study does not deal directly with the possible transformative or revolutionary impact of computer-communications technology, as noted above, this potential impact is part of what makes the questions we are concerned with of interest and importance. More specifically, the emergence of a mass market, that is the widespread usage of computer-communications services, is a pre-condition to the technology's exerting a real social and economic impact on society. The emergence of a mass market and the timing of that emergence, in turn, is an economic, not a technological, question. The characteristics of both the demand and supply sides of the market, of both consumers and producers, will be involved and will determine whether, how, by whom and for what the technology is used on a wide scale. As Godfrey and Chang note:

> If there is to be real social impact . . . it will first reveal itself in the marketplace; predictions and warnings made without careful attention to marketplace realities are likely to be invalid.[3]

This study, also does not examine the potential negative social consequences that could accompany widespread adoption of computer-communication technology: technology-induced unemployment; increased regional disparities; a widening of the information gap between rich and poor and between well-educated and less well-educated; social alienation/isolation; privacy concerns, and so on. Some of these are mentioned in the context of government policy, but none are examined in detail. This omission does not imply, however, that these possible negative consequences are insignificant or do not deserve to be treated seriously but simply reflects the particular focus of this study.

The procedure for analysis is based on an examination of the demand side of the market using a model which takes explicit account of a new product which is added to an existing set of consumption activities. To facilitate this discussion of market demand determinants, a taxonomy of service offerings is first developed in Chapter Two. This taxonomy sets the range of service potentials and classifies these in terms of functional areas of application, human

capabilities and dynamic or interactive qualities. These categorizations, individually and together, are relevant to the reasons for people using the services and to the implications of the services for the users.

Demand, of course, is only one-half of the market. While the argument presented in the demand analysis of Chapter Three makes that side of the market of paramount importance, supply side characteristics are by no means unimportant. Chapter Four offers an analysis of these supply side characteristics or producer-related issues: hardware options and choices; service packaging and content; financing; pricing; competition and market structures; and marketing and carrier or distribution options.

In Chapter Five, the analysis of Chapters Three and Four is brought together to examine some possible scenarios of market development in Canada over the next three to five years and to develop a scenario which is most likely to maximize the growth of the market within that time period.

Finally, Chapter Six puts the discussion and analysis of Chapter Five into a public policy context, examining ways in which government may, if it chooses, promote the market development scenario developed and casting the whole issue of market development in the larger context of government's goals. Chapter Six is concluded with a reiteration of the argument presented in the Executive Summary: "Services, such as content and applications, not hardware, are what matter both in terms of market development and social objectives. Services are what must concern industry, consumers and government alike."

Notes

1. "Terms of Reference for OECD Panel on Policy Issues of Computer/Telecommunications Interaction: May, 1970," in "Computers and Telecommunications," Vol. 3, OECD Informatics Studies (Paris: OECD, 1973). Quoted in D. Parkhill, "The Necessary Structure," in D. Godfrey and D. Parkhill (eds.), Gutenberg Two (Victoria: Press Porcepic, 1980), p. 95.

2. R. Curnow and S. Curran, "The Technology Applied," in G. Friedrichs and A. Schaff (eds.), Microelectronics and Society, for Better or for Worse, A Report to the Club of Rome (Oxford: Pergamon Press, 1982), p. 113.

3. D. Godfrey and E. Chang, "Telidon Is More Than Videotex," in D. Godfrey and E. Chang (eds.), The TELIDON Book (Victoria: Press Porcepic, 1981), p. 2.

2: A TAXONOMY OF SERVICE OFFERINGS

As noted in Chapter One, computer-communications services include, for the purposes of this study, those services involving the combined use of computers and electronic communications for the remote delivery of computerized data bases and/or the connection of an end-user with a computer situated elsewhere. This definition, thus, precludes normal broadcasting services, such as radio, television, cable television, and pay-TV. It also precludes normal telephony services. The fact that computerization of telephone switching and transmissions facilities is now common does not qualify standard telephony services as a computer-communications service, for the use of computers in the working of the network does not constitute either the remote delivery of a computerized data base or direct interaction between an end-user and a computer situated elsewhere.

The definition of mass consumer market, set out in Chapter One and described in greater detail in Appendix A, places a further major limitation on the range of services under consideration. Because the definition of mass market includes the availability of the service to the general public, all internal or local networks are excluded from consideration although this procedure may change if, in the future, some local networks do allow public access. Also, since widespread usage is another element of the definition of mass market, closed-user group[1] applications are excluded even when the closed group involves

parties from more than one organization. Specialized service offerings are not withheld, however, in principle. In practice, characteristics of particular services, such as price or required level of computer literacy, may disqualify certain specialized service offerings from inclusion in the mass market. This exclusion, however, is not a definitional concern. The mass market, which is defined in aggregate market terms rather than in terms of individual services or service providers, does not preclude the inclusion of services that, by themselves, have a relatively small audience. As long as such services are available to the general public, they represent part of the market as defined.

These qualifications still leave a very broad range of service offerings to consider. To list all such services is not practical nor, for that matter, particularly useful. Rather, assuming that by using an appropriate classification system, certain general classes of services will be identified, the relevant characteristics of these services that will influence their emergence or the timing of their emergence as part(s) of the mass market can be analyzed.

Some Alternative Classifications

Several authors/observers who have examined the field of computer-communications services have adopted a classification scheme based on the general purpose of the service. Tydeman, for example, makes use of the following five-fold classification:

1. information retrieval services
2. transactions services
3. messaging services
4. computing services
5. telemonitoring services[2]

The industry itself tends to categorize services in terms of content orientation. Thus, for example, The Source uses the following general classification:

1. communications
2. business and finance
3. travel
4. news and sports
5. entertainment/games
6. consumer services[3]

The Source's classification, based on content orientation, overlaps Tydeman's functional classification. "News and Sports," for example, would largely fall within "information retrieval" as would parts of "entertainment/games" (daily horoscopes, movie reviews), "travel" and "consumer services." On the other hand, "computing services" are, to the extent they exist on The Source, classified partly under "communications" and partly under "consumer services." "Communications" obviously includes "messaging services" and "consumer services" includes "transactions services."

The NABU Network in Canada offers four categories of programming: news, family entertainment, educational programming and general entertainment. Like The Source, these categories describe content focus in a way not consistent with a functional classification such as Tydeman's, in the sense that neither classification is a subset of the other; they are alternative not complementary classifications.

A slightly different classification from that of the NABU Network or The Source arises from a grouping of services based on the characteristics/orientation of information providers. One example of such a classification is the following: banking, shopping, news, education, games, messaging, classified, programs, entertainment guides and consumer information.[4] Though very similar to a content classification used by NABU or The Source, this method differs primarily in the level of aggregation at which categories are defined. A similarity also exists between this IP-based classification and a functional classification such as Tydeman's. Again, the difference lies in the level of aggregation. What both of these comparisons indicate is that the more disaggregated the classification, moving in the extreme to a description of individual data bases, the more compatible the various general ways of classifying the market will be. However, insofar as the purpose of classifying services is to avoid a detailed listing, this scheme is not very helpful.

Quite commonly, computer-communications services, particularly videotex services, are classified into two-way services and one-way services.[5] In the specific case of videotex, one-way services are known as teletext. This distinction between one-way and two-way services has both technological and functional implications. The technological

implications arise from the fact that one-way and two-way services normally involve different distribution technologies. One-way systems involve a broadcast-type distribution while two-way systems involve an individualized on-line connection. With one significant exception, broadcast distribution means that:

1. everybody receives the same data base(s); user selectivity is exercised only in terms of which elements of the data base put out in a broadcast cycle the user chooses to hold.
2. no other level of interaction is possible within the broadcast distribution system itself; it is possible to construct hybrid systems which use, for example, a telephone line for return responses from the user, but there is not a direct on-line interactivity.

Two-way systems, which, theoretically at least, could be carried out using cable, telephone or satellite,[6] create the possibility of:

1. direct response by users within the distribution system delivering the service(s) to the user.
2. the possibility of limiting access to a data base or some element of a data base to designated users.

The significant exception to these normal distinguishing characteristics between one-way and two-way services is a system which uses a broadcast mode combined with a terminal with programmable processing capability, like a personal computer, and operates through downloading of data bases into the terminal from where the user is able to manipulate them and to interact locally. Such a system does, in fact, exist. The NABU Network operates in this way.

This system still differs from a two-way on-line system in functional terms because, by itself, it is still not capable of handling either messaging services or transactions services. Normal one-way broadcast systems would also not be able to offer computing services or games if they did not make use of a computer as the user's terminal device. Monitoring services, in addition, could not be provided, in a strict sense, on a broadcast system. However, if cable is the physical distribution system being used for delivery of the broadcast service and if the cable plant is equipped with addressable technology, then monitoring can be supplied through a polling strategy whereby the head-

end computer, or a third party computer, polls a set of monitoring devices at each address on a recurrent cycle. This process is technically different than monitoring on a two-way system where the message would originate at the user's end; in practical terms, though this difference may be indistinguishable to users.[7]

Thinking of classifying services more strictly in technological terms than in the simple one-way, two-way classification is possible. Such a categorization, as one superimposed on other classification schemes, is implicit in the literature which distinguishes videotex and teletext from other computer-communications services.[8] Talk about ASCII-based services, real-time services, text services, graphics services, colour services and so on could also be included.

These technological distinctions, unless they have functional implications, are not a particularly useful way of attempting to categorize the market. As a general proposition, users will not care how they receive the service, or how the data base is mounted or configured, as long as the service does for them what they want at a cost that is acceptable. Thus in seeking to categorize the market it is more useful to concentrate on a functional classification, that is user applications, and to introduce technological concerns only as they have implications for function. That there are non-computer-communications technologies that are capable of performing many of the same functions as computer-communications services should, however, be kept in mind. While a technological breakdown of the computer-communications field itself is not one which will be pursued as a way of classifying the market, competing technologies from outside the field will be of interest in assessing the market potential of computer-communications services.

Martin[9] has listed various telecommunications services in the home. (Table 2.1) This list, however, does not correspond to our needs in three important respects. First, Martin is looking at telecommunications services rather than computer-communications services and, therefore, includes a number of telephony or broadcasting services which lie outside of our definition of the market. These services, though, do represent possible substitutes for services which are part of the market. Second, Martin is looking only at the

Table 2.1

Possible Telecommunications Services in the Home

Passive entertainment

- Radio
- Many television channels
- Pay TV (e.g. Home Box Office—movies, sports, etc.)
- Dial-up music/sound library
- Dial-up movies
- Subscriber-originated programming

People-to-people communications

- Telephone
- Videophones
- Still-picture phones
- Videoconferencing
- Telephone answering service
- Voicegram service
- Message sending service
- Telemedical services
- Psychiatric consultation
- Local ombudsman
- Access to elected officials

Interactive television

- Interactive educational programs
- Interactive television games
- Quiz shows
- Advertizing and sales
- Politics
- Television ratings
- Public opinion polls
- Debates on local issues
- Telemedical applications
- Interactive pornography
- Betting on horse races
- Gambling on other sports

Table 2.1 (Cont'd.)

Possible Telecommunications Services in the Home

Still-picture interaction

- Computer-assisted instruction
- Shopping
- Catalogue displays
- Advertizing and ordering
- Consumer reports
- Entertainment guide
- City information
- Obtaining travel advice and directions
- Tour information
- Boating/fishing information
- Sports reports
- Weather forecasts
- Hobby information
- Book/literature reviews
- Book library service
- Encyclopedia
- Politics
- Computer dating
- Real estate
- Games for children's entertainment
- Gambling games (bingo)

Monitoring

- Fire alarms on-line to fire service
- Burglar alarms on-line to police
- Remote control of heating and air conditioning (a user sending commands to this equipment from a distant telephone)
- Remote control of cooker
- Water, gas, and electricity meter reading
- Television audience counting

Table 2.1 (Cont'd.)

Possible Telecommunications Services in the Home

Telephone voice-answerback

- Stock market information
- Weather reports
- Sports information
- Banking
- Medical diagnosis
- Electronic voting

Home printer

- Electronic delivery of newspaper/magazines
- Customized news service
- Stock market ticker
- Electronic mail
- Message delivery
- Text editing; report preparation
- Secretarial assistance
- Customized advertizing
- Consumer guidance
- Information retrieval
- Obtaining transportation schedules
- Obtaining travel advice/maps

Computer terminals

- Income tax preparation
- Recording of tax information
- Banking
- Domestic accounting
- Entertainment/sports reservations
- Restaurant reservations
- Travel planning and reservations
- Computer-assisted instruction
- Computation
- Investment comparison and analysis

Table 2.1 (Cont'd.)

Possible Telecommunications Services in the Home

Investment monitoring
Work at home
Access to company files
Information retrieval
Library/literature/document searches
Searching for goods to buy
Shopping information; price lists and comparisons
Real estate searching
Job searching
Vocational counseling
Obtaining insurance
Obtaining licenses
Medicare claims
Medical diagnosis
Emergency medical information
Yellow pages
Communications directory assistance
Dictionary/glossary/thesaurus
Address records
Diary, appointments, reminders
Message sending
Christmas card/invitation lists
Housing, health, welfare, and social information
Games (e.g. chess)
Computer dating
Obtaining sports partners

Source: J. Martin, Future Developments in Telecommunications, 2nd edition, (Englewood Cliffs: Prentice-Hall, 1977), pp. 314-316.

home market. As previously noted our definition of the mass market is not restricted to the home or residential market even though the home market is clearly an important component of the mass market. Business or government oriented services, except for the case of closed user group applications, are also included. Third, Martin's general classification scheme is, to a large extent, a technology-based classification, established both on the medium being used for transmission or viewing and/or the hardware elements involved in the service.

In spite of these reservations, Martin's list is useful in providing an initial view of the kinds of services available and many of its elements will be used in the taxonomy developed here.

One-way vs. Two-way Systems

Tydeman[10] expands on his five general categories of service by listing, under each general category, various application areas and/or specific types of applications. (Table 2.2) Like Martin, Tydeman is primarily concerned with home-based systems, but he includes certain business applications which individuals want to access from the home and also a few that would be only accessed from the office, such as "inventory/stock control." Tydeman focuses on teletext/videotex applications. Tydeman uses these terms, however, in a generic sense rather than a strict technological sense so that his definition of teletext/videotex comes very close to our own definition of computer-communications services. Tydeman's grouping of teletext and videotex applications together in this taxonomy means that the individual application areas are not identified as being one-way or two-way services. While many of them are, or could be, both and while any one-way service necessarily can be provided as part of a two-way system, certain two-way services cannot be provided as one-way services. It is also relevant to note that the properties of a service, relative to its general classification, may differ depending on whether it is one-way or two-way. As Tydeman notes:

> . . . many one-way information retrieval services could be enhanced by interactive transactions and/or messaging capabilities. An electronic version of the Official Airline Guide would be classified as an information-retrieval

Table 2.2

Future Teletext/Videotex Applications

I. Information Retrieval

Application Area	Individual Applications
Electronic Publishing	- electronic newspapers - specialized newsletters - electronic encyclopedia
Library and Reference Service	- data base access - catalogue review
Community Services	- community bulletin board - transit/travel information - emergency information - government information - housing availability - comparison shopping - electronic hotlines - foreign language service - captioning - electronic directories
Education	- course listings - CAI/CMI - special services for home-bound students - supplemental materials for education TV programs - do-it-yourself training - literacy - retraining
Health	- storefront medicine - first-aid

Table 2.2 (Cont'd.)

Future Teletext/Videotex Applications

Entertainment	- electronic jukebox - on-demand TV
Advertising	- electronic yellow pages - supplement to TV advertising - classified advertising - display advertising
II. Transactions	
	- electronic checkbook - electronic funds transfer - electronic credit cards - electronic catalogs - gambling - entertainment options
III. Messaging	
	- electronic mail - "videotexgram" - conferencing - serendipity machine - electronic welcome wagon - referenda or quasi-referenda - consumer action - electronic gossip - internal business communication - market research

Table 2.2 (Cont'd.)
Future Teletext/Videotex Applications

IV. Computing

- video games
- home computing service
- personal information storage
- financial management
- telework
- extensions of corporate management systems
- inventory/stock control

V. Telemonitoring

- home security
- health and safety monitoring systems
- energy management

Source: J. Tydeman, et al., Teletext and Videotex in the United States (New York: McGraw-Hill, 1982), pp. 65-69.

> service; addition of a trip-planning service would involve computing, while inclusion of the capacity to make reservations would require a transaction capability.[11]

At a more general level, this last example illustrates the further point that, for two-way services, the "primary functional classification"[12] categories may not be mutually exclusive. Services may fall under more than one classification (function) depending on the way they are used. Others may not even provide a unique classification according to individual users/usage. As Tydeman notes, "A few applications (e.g. computer-assisted instruction, which utilizes both information retrieval and computing) are true hybrids requiring two or more functions."[13]

One of the very important implications regarding the categorization of two-way services is that the technological distinction between one-way and two-way service does not really capture the essence of the functional distinction which these two alternatives represent. A two-way service which does nothing more than deliver information will be technologically distinct from a one-way service doing the same thing. Functionally, however, the two will be indistinguishable. What is, in fact, the crucial functional attribute which the one-way/two-way distinction is addressing is the level of interactivity allowed or utilized.

A one-way service, in terms of the level of interaction between the end-user and the remote computer, which downloads content to a local computer will be indistinguishable from a two-way on-line interactive system for all but transactions and messaging services. A two-way system which is used simply to receive information, with no on-line interaction beyond the selection of content, will be indistinguishable from one-way systems, such as teletext, which provide no processing capability beyond the selection of content.

Rather than classifying services as one-way and two-way, we will refer to interactive and consumptive services. An interactive service is defined as a service providing some level of direct processing capability, other than the selection of pre-packaged content. A comsumptive service is defined as a service which provides no processing capability, other than the selection of pre-packaged content. This classification captures the functional distinction usually intended

in the one-way/two-way categorization, but avoids the presumption of a one-to-one correspondence between their functions and one-way versus two-way technology. In the taxonomy which follows, interactive and consumptive will be used as the most general level of classification.

User Capabilities

While we have argued earlier for a functional classification of service offerings or applications, it is also possible to view the potential range of service offerings from the perspective of user capabilities, those human capabilities which the service offering relates to or influences in some way. Kochen[14] has described this view as follows:

> There are at least three powerful capabilities we may expect of this technology: amplification of an individual's cognitive abilities, regulation and control of an individual's affect, and new forms of communication and control in society.[15]

Kochen then describes what is meant by each of these three capabilities.[16] In terms of "amplification of cognition," he points out that, "the likely future of technologies will enormously extend the analytical reasoning ability of planners, policy analysts, scientists and other individuals in tasks limited by capacities for vertical thinking, data analysis, and scientific inference."[17]

"Regulation of affect" involves an improved capacity for individuals to deal with emotion-laden trade-offs, as "[t]he broader band widths of communication channels and input/output devices, more sophisticated simulation languages, greater storage capacities make it possible to create more effective simulations . . . we should anticipate a variety of major applications of simulation technology to help not only designers and professionals, but ordinary individuals with difficult conflicting choices."[18] He adds, "A closely related task in the regulation of affect arises in coping with complexity, with or without a conflicting choice . . . [t]he issues are generally complex, involving many interacting variables, with little clarity about the possible solutions, their properties, or what information is helpful in finding an adequate solution. Mass media cannot filter from their broadcasts the purely cognitive aspects from those arousing emotions. Techniques that extend computer-aided instruction or that provide individualized point-

to-point communication could affect such a separation."[19] Finally, Kochen notes, "The variety of options in both form and content in the presentation of information by computer offers certain programmers new means of regulating the emotions likely to be evoked in various users."[20]

Regarding "communication and control" Kochen offers two observations which are relevant to our purposes: First, that "[t]he organization of societies into communities and neighbourhoods can exhibit coordinated integration or dissonant fragmentation. The emerging communications technologies can greatly affect social stability in this sense, particularly at the level of ethical values."[21] Secondly, that, "[c]ontrol over how needed information is requested passes from the information designer to the user, at least to some extent . . . Unlike the present use of mass media, with one message broadcast to reach all levels in a single, one-directional, point-to-mass transmission, the new technologies will permit different users to obtain custom-tailored messages, in a conversational rather than a lecture mode, while being initiated and controlled by him rather than by the sender."[22]

Kochen's description of these three capabilities moves somewhat outside our present framework in that he is not, in all cases, bound by either presently or imminently available services or technology. Also, he is dealing, to a large extent, with highly professional or process oriented applications rather than more mundane tasks such as games, restaurant guides, banking and shopping. Nonetheless, at the risk of taking some licence with his terminology, we can adapt his three capabilities to our purpose by defining the terms in the following way:

Amplification of cognition

- the enhancement, improvement or strengthening of mental capacities such as memory, calculation and thought, through improved data storage, more rapid display of facts, improved capacity for presenting relationships, provision of translation capability and provision of algorithms, the workings of which may not be exactly known to the user.

Regulation of Affect

- the enhancement or improvement of the capacity of

individuals to deal with value judgements, to cope with complexity and to separate the cognitive aspects of an issue from the emotional aspects through improved capacity for presenting relationships, provision of simulation capability, improved qualities of instruction and individualized communication.

Communication/Control

- the enhancement or improvement of social interaction, social stability, and, for individuals, control over content/presentation of data/messages through custom-tailoring of messages/content, networking, and other processes which influence the ability of users to achieve some desired outcome.

A Preliminary Taxonomy

If these three capabilities are superimposed on Tydeman's five-way functional classification so that they are treated as complementary classifications rather than as alternatives, we can produce a matrix as shown in Table 2.3, (which includes only the applications by Tydeman outlined in Table 2.2).

The virtue of this double classification is its simultaneous emphasis on two different dimensions of the user experience with any particular type of service. On the one hand it shows the immediate functional purpose of the service area in terms of the user need being served, and, on the other hand, it shows how the user's human capabilities relate to, or are influenced by, the service. Thus, a given box in the matrix indicates the relationship, as expressed in a particular type of service offering, between the user's human capabilities and the functional purpose of the service or the user's needs.

This double classification scheme may not, in fact, add a great deal to our understanding of the short run market characteristics of computer-communications services, given the relative newness of all of the services and, hence, the general lack of familiarity on the part of users with the full range of properties of these services. In the longer term, the way in which the services relate to and impact on human capabilities will primarily determine the transformative effects of this technology on society. Therefore, it is extremely useful to begin to appreciate and better understand this dimension of the technology even

Table 2.3

Classification of Computer-Communications Service Offerings

Capability	Function: Information Retrieval	Transactions	Messaging	Computing	Monitoring
Amplification of Cognition	- electronic newspapers - electronic encyclopedia - library data bases - library catalogue review - transit information - emergency information - housing availability - comparison shopping - captioning - electronic directories - education course listings - government information - community information - storefront medicine - first-aid - classified advertising - display advertising - supplement to TV advertising - electronic yellow pages	- on-demand TV - electronic jukebox	- electronic hot lines	- personal information storage - inventory/stock control	
Regulation of Affect	- CAI/CMI - special services for home-bound students - supplemental materials for TV programs - retraining - literacy - travel information			- home computing service - video games - financial management - telework - extensions of corporate management systems	
Communication/ Control	- do-it-yourself training - specialized newsletters	- electronic checkbook - electronic funds transfer - electronic credit cards - electronic catalogues - gambling - entertainment options	- community bulletin board - electronic mail - videotexgram - conferencing - serendipity machine - electronic welcome wagon - referenda or quasi-referenda - consumer action - electronic gossip - internal business communication - market research		- home security - health and safety monitoring - energy management

if, at this point, we are dealing with it only in developing a taxonomy of service offerings.

One of the points to be emphasized regarding Table 2.3 is that the classification of certain individual services by either method is, to some extent, arbitrary. As far as possible, services have been classified under the function and capability which seems best to represent the primary orientation of the service in each respective context.[23] But, several entries could easily have been classified elsewhere. Travel information, for example, has been shown under regulation of affect/information retrieval. It might well have been listed under amplification of cognition/information retrieval. Which classification is most appropriate will, to a large extent, depend on the service offering itself. The regulation of affect category is most appropriate if the service allows the user actually to experience something of the travel site. If it is, however, relatively bland, objective information, such as the price of hotel rooms and the availability of hotel rooms, it would probably be more appropriately placed in the amplification of cognition category. Apart from this question of primary purpose, many of the services listed have, by their nature, elements of more than one category. Electronic banking services, for instance, have elements of both information retrieval (checking one's chequeing account balance or current interest rates) and transactions (transferring funds or paying bills). Also, a message component (being advised by the bank that one's account is overdrawn or a cheque deposited was returned NSF) could be included. To avoid duplication in the listings, cross-listings taking into account the multi-faceted nature of certain services are not shown. The multi-faceted nature, however, is an important point for the reader to bear in mind in examining Table 2.3.

Since Table 2.3, as noted earlier, lists only those services put forward by Tydeman, it does not include a number of services actually or potentially available in the market place. Moreover, it is possible to specify in more detail some of the services which Tydeman includes. Also, Table 2.3 follows Tydeman in not drawing a distinction between interactive and consumptive services as these terms were earlier defined.

A Final Taxonomy

Table 2.4, (which separates interactive and consumptive services and adds some additional services and/or provides a finer breakdown of some of Tydeman's applications), represents an extension of Table 2.3. Although this new listing is reasonably exhaustive in terms of services now available or perceivable, it is important to remember that there may be many services which will ultimately develop which are still missing because we cannot yet imagine them. We tend to think of new developments first in terms of our present experience. Thus, it may be far from coincidental that the greatest number of listings in Tables 2.3 and 2.4 occur under the information retrieval category and the amplification of cognition category.

An examination of Table 2.4 reveals a number of interesting conclusions apart from the proportionately greater number of entries for both information retrieval and amplification of cognition. First, consumptive systems are quite capable of delivering a great many services. Second, consumptive systems cannot deliver as many services as interactive systems. Third, in functional terms, consumptive systems cannot be used for virtually any transactions services or monitoring services or for any messaging or computing services. The primary, if not exclusive, function served by consumptive systems is, therefore, information retrieval. Fourth, the nature of many consumptive services within the information retrieval category is more limited than the same type of service offered on an interactive system in that consumptive services lack the dynamic properties of which interactive services are capable; consumptive services are static by definition. Fifth, following from the second, third and fourth conclusions, interactive systems are much richer than consumptive systems. This conclusion, however, takes no account of user preferences or of the economics of consumptive versus interactive systems. Sixth, on a human capability basis, consumptive services, proportionately, affect cognition relative to the capabilities of regulation of affect and communication/control more than interactive services. In other words, consumptive services relate overwhelmingly to amplification of cognition; services which influence regulation of affect and communication/control are overwhelmingly a function of interactive systems.

Table 2.4

Classification of Computer-Communications Service Offerings

Interactive	Consumptive
I. Amplification of Cognition	
A. Information Retrieval	
electronic newspapers	electronic newspapers
electronic encyclopedia	electronic encyclopedia
library data bases	library data bases
library catalogue review	library catalogue review
transit information (dynamic)	transit information (static)
housing availability (dynamic)	housing availability (static)
comparison shopping (dynamic)	comparison shopping (static)
captioning	captioning
electronic directories	electronic directories
education course listings	education course listings
community information	community information
first-aid	first-aid
medical information	medical information
classified advertising	classified advertising
display advertising	display advertising
supplement to TV advertising	supplement to TV advertising
electronic yellow pages	electronic yellow pages
emergency information	emergency information
government information	government information
book/literature reviews	book/literature reviews
event evaluation	event evaluation
consumer information (dynamic)	consumer information (static)
political, economic, social, market, and technology forecasts	political, economic, social, market, and technology forecasts
hobby information	hobby information
political profiles	political profiles

Table 2.4 (Cont'd.)

Classification of Computer-Communications Service Offerings

Interactive	Consumptive
I. Amplification of Cognition	
A. Information Retrieval	
industrial profiles	industrial profiles
traffic analysis (dynamic)	traffic analysis (static)
pharmaceutical information	pharmaceutical information
tax information/guides	tax information/guides
mortgage information/services	mortgage information/services
dictionary/thesaurus	dictionary/thesaurus
weather information	weather information
journals/magazines/books	journals/magazines/books
B. Transactions	
on-demand TV	on-demand TV (only on subscription, unlimited usage basis)
electronic jukebox	electronic jukebox (only on subscription, unlimited usage basis)
information provider sales	--
C. Messaging	
electronic hot lines	--
D. Computing	
personal information storage	--
inventory/stock control	--

Table 2.4 (Cont'd.)
Classification of Computer-Communications Service Offerings

Interactive	Consumptive
II. Regulation of Affect	
A. Information Retrieval	
CAI/CMI	
special services for home-bound students (dynamic)	special services for home-bound students (static)
supplemental materials for TV programs (dynamic)	supplemental materials for TV programs (static)
retraining (dynamic)	retraining (static)
travel information (dynamic)	travel information (static)
research assistance	
vocational counselling	vocational training information
training simulations	--
political scenarios	--
employment information/job searching	employment information
artistic workshops	--
B. Transactions	
complex issue testing	--
text/graphics report generation	--
medical claims	--
computer dating	--
document delivery	--
C. Messaging	
town meeting	--
"debate" on political issues	--

Table 2.4 (Cont'd.)

Classification of Computer-Communications Service Offerings

Interactive	Consumptive
II. Regulation of Affect	
D. Computing	
economic modelling	--
home computing service	--
video games	--
financial management	--
telework	--
extensions of corporate management systems	--
III. Communication/Control	
A. Information Retrieval	
do-it-yourself training (dynamic)	do-it-yourself training (static)
specialized newsletters	specialized newsletters
specialized journals/magazines	specialized journals/magazines
B. Transactions	
electronic checkbook	--
electronic funds transfer	--
electronic credit cards	--
electronic gambling	--
entertainment options	--
- travel, restaurant, hotel reservations	
- theatre/sports tickets	

Table 2.4 (Cont'd.)

Classification of Computer-Communications Service Offerings

Interactive	Consumptive
III. Communication/Control	
B. Transactions (Cont'd.)	
electronic shopping	--
book lending	--
book buying	--
inter-library loans	--
used goods trading	--
teletypesetting	--
brokerage services	--
- shopping	
- banking	
- insurance	
C. Messaging	
community bulletin board (dynamic)	community bulletin board (static)
electronic mail	--
videotexgram	--
conferencing	--
serendipity machine	--
electronic welcome wagon	--
referenda or quasi-referenda	--
consumer action	--
electronic gossip	--
internal business communication involving external access	--
market research	--
complaints	--

Table 2.4 (Cont'd.)
Classification of Computer-Communications Service Offerings

Interactive	Consumptive
III. Communication/Control	
E. Monitoring	
home security	home security (by polling system)
health and safety monitoring	--
energy management	--
remote control of household functions	--
meter reading	meter reading (by polling system)

Note to Table 2.4

The terms static and dynamic refer to the nature of the content that can be delivered by a particular service. An interactive service, such as traffic analysis, for example, can be made to provide users with customized routings on request. This service would be dynamic. The same service as consumptive could only provide routings pre-programmed into the system. This service would be static. In general, dynamic refers to the ability of the user to vary the content and/or the presentation of content while static refers to a fixed content/format which the user cannot influence.

None of these conclusions are particularly surprising, or, by themselves, do they advance us very far. Before any conclusions can be drawn on the superiority of interactive services over consumptive services, a great deal of further information is required. Specifically, consumer preferences. If users do not want the additional services or service capability of interactive systems, then these features of interactive systems will be no more than technological niceties. More must be known about the economics of the different types of system. If consumptive systems are much cheaper than interactive systems, then, even if consumers like the extra features offered by interactive systems, they may not be willing to buy them. More must be known about the content and form of service offerings, the number of producers, the structure of markets, etc. If interactive services in practice are no different than consumptive services, that is, if their interactive capability is not used, then there will be no superiority. If different producers are offering consumptive services and interactive services, the two will be competitive; if the same producers offer both, they might well be complementary, and so on.

All of these possibilities must be explored. The listings which have been included in Table 2.3 and Table 2.4 are all services which computer-communications technology makes possible, are all services which in some form are presently available or under consideration in North America and are all services which could, at least collectively, form the basis of a mass market. At present, however, they have not developed to the mass market stage, either individually or collectively. The factors which will determine the emergence of the mass market and the timing of that emergence must still be addressed.

Notes

1. A closed-user group is a case where some restriction, other than open-market constraints such as price, is placed on access to the service. In other words, conditions of membership in the group are defined to include criteria not within the discretionary control of potential members. Thus, for example, if a legal data base is available only to members of the Canadian Bar Association or its affiliates, such a service would fall within the closed-user group classification.

2. J. Tydeman, et al., Teletext and Videotext in the United States (New York: McGraw-Hill, 1983), p. 3.

3. The Source Command Guide, Fall/Winter 1983 (McLean, VA: Source Telecomputing Corp., 1983).

4. This classification was obtained from David Carlyle during a personal interview.

5. See, for example, Tydeman, op. cit.

6. While all of these are theoretically possible, in practice cable systems as presently available in North America do not have two-way capability and satellites, to be used for two-way services, would require an earth station for the user which has both a downlink and an uplink capability.

7. The major implication of this difference is that the response time may be affected. On a polling system, a particular monitor only gets checked once in a cycle and only in a predetermined order within the cycle. Depending on the size of the cycle, i.e., how long the time interval between passes by any particular monitor, a problem may not be identified as quickly as if a message was immediately sent by the monitor (or a local control unit) as soon as the problem begins. In practice any difference is probably one of seconds and is not likely to be of practical significance.

8. See discussion of this point in Appendix A.

9. J. Martin, Future Developments in Telecommunications, 2nd ed. (Englewood Cliffs: Prentice-Hall, 1977), pp. 314-316.

10. Tydeman, op. cit., pp. 65-69.

11. Ibid., p. 64.

12. Ibid., p. 64.

13. Ibid., p. 64.

14. M. Kochen, "Technology and Communication in the Future," JASIS, 32, 2, March 1981.

15. Ibid., pp. 148-149.

16. Ibid., pp. 149-151.

17. Ibid., p. 150.

18. Ibid., p. 150.

19. Ibid., p. 150.

20. Ibid., p. 150.

21. Ibid., p. 151.

22. Ibid., p. 151.

23. For the functional classification, with the exception of "community bulletin boards," Tydeman's listing has been adhered to.

3: DEMAND ANALYSIS

The taxonomy of service offerings laid out in Chapter Two represents the potential of the mass market. All of these services and the functions and/or capabilities to which they relate exist or are under consideration in North America. But, they have not yet developed in terms of availability, number of users or levels of usage, to the mass market stage.

Ultimately, the emergence of the mass market for computer-communications services will depend on both supply side and demand side market influences/characteristics. Chapter Three examines the demand side of the market.

A Review of Existing Forecasts

Since the late 1970s there have been a number of forecasts of the expected growth of the computer-communications services market or, in the Canadian case, of the videotex market.

In a 1979 study,[1] Hickling-Johnston predicted that by 1985 there will be 350,000 Telidon subscribers in Canada.[2] By 1991, they estimate this figure will be 1.9 million.[3]

In a 1980 study,[4] Michael Tyler forecast that by 1985 there will be between 410,000 and 830,000 subscribers to videotex and videotex-like electronic publishing services in the United States.[5] Hickling-Johnston forecast a U.S. market size 10 times that of Canada or 3.5 million subscribers by 1985.[6]

Hough and Associates, in a 1980 report,[7] offered two alternative forecasts of Telidon growth based on two different methodologies. First, using a historical analogy method, Hough estimated between 85,000 and 140,000 Telidon terminals in Canada by 1986.[8] Second, using an income-expenditure approach, it is estimated that "the number of potential videotex households that might reasonably be expected in 1985 . . . is only 26,000."[9] This figure is, however, relatively sensitive to the user cost of Telidon, for the figure assumes a monthly user cost of $25. If the cost were $13, according to Hough's estimates, the potential market size increases to 650,000 households.[10] By making assumptions regarding adoption rates within the potential subscriber body, Hough concludes, according to his income-expenditure method, that by 1985, actual Telidon subscribers in Canada will number between 13,000 and 150,000, depending on the monthly cost of the service.[11]

A 1979 report by Tamec Inc.[12] forecast that by 1985 between 1,489,000 videotex households in Canada (pessimistic scenario) and 2,190,000 videotex households in Canada (optimistic scenario) will be subscribers. These figures are predicted to be 4,524,000 and 6,536,000 respectively by 1990.[13]

All these estimates of Telidon or videotex market growth are concerned only with videotex rather than the full range of computer-communications services and strictly with households rather than the full range of potential users which would also include government and business. Despite this limitation, one of the most striking conclusions to be reached is that they all overestimate the market in reality, including Hough's lower limit estimate using the income-expenditure approach. While 1985 (or 1986 for Hough's historical analogy estimates) is not yet over, the size of the market attained by videotex to date makes it virtually impossible that any of the 1985 projections will be met.

A detailed review of the basis for these various forecasts will not be offered here, even though subsequent discussions will refer to these studies when they are relevant. For the moment only one general observation regarding all of these forecasts will be made. That observation is that none of them use a method which takes into account any of the attributes or characteristics of videotex service. Tyler

comes closest, perhaps, insofar as his estimates derive from an initial estimation of the size of the personal computer market and from the assumption that the personal computer market will drive the videotex market. Tyler also includes videotex-like services, which, at least partially, extend his definition of the market towards the full range of household computer-communications services, but still stops short of the total market as defined here.

Because these forecasts do not consider the characteristics of the service, they can be criticized or questioned on several grounds:

1. Insofar as they are videotex specific, the lack of consideration of the distinguishing characteristics of videotex versus other computer-communications services means that the estimates make no allowance for the possible substitution of other computer-communications services for videotex. Tyler's estimates are the least objectionable on these grounds.
2. Insofar as they are household-specific, the lack of consideration of distinguishing characteristics of household services versus business or government services means that the estimates do not allow for the potential complementariness among these three audience groups.
3. Insofar as they take no account of the distinguishing characteristics of videotex or videotex-like services as computer-communications services, they fail to consider either potential substitution effects or potential complementarity effects between computer-communications services and non-computer-communications alternatives for delivering the same or similar end results to consumers.

It is extremely important to realize that the listing of service offerings developed in the taxonomy in Chapter Two presents little that is new in the sense that almost nothing in the list cannot be provided in some fashion without using either computers and/or electronic communications. Computer-communications applications may be superior to their alternatives for various reasons, but the services themselves, in a generic sense, are not unique. What distinguishes computer-communications services from other technologies, both non-electronic products such as print publications and electronic

technologies such as commercial television or videodisc, are the particular attributes of each technology. Equally important will be users' reactions to these characteristics. The tastes, preferences and attitudes of potential users will determine the extent to which the attributes of computer-communications services give rise to actual usage.

Recognition of the fact that the characteristics of computer-communications services coupled with consumer reaction to those characteristics will define the market for computer-communications services leads to three conclusions:

1. the evaluation of the potential demand for computer-communications services requires an understanding of the characteristics of both computer-communications services and non-computer communications services;
2. the evaluation of the potential demand for computer-communications services requires an understanding of consumer reaction to the characteristics of computer-communications services in contrast to non-computer-communications services, including the level of satisfaction or dissatisfaction with present services;
3. the relationship between computer-communications services and non-computer-communications services may be substitutive (more commonly referred to as competitive) or complementary.

These issues on the demand side of the market will be explored in the balance of this chapter.

Demand Models

The standard economic paradigm of demand posits a relationship between the demand for a product and the price of the product, the price of substitute or complementary products, income levels and tastes.

While this paradigm has great utility for the analysis of demand for established goods, it is less satisfactory when one is dealing with a new good. As noted by Lancaster:

> Traditional demand theory has never been able to handle satisfactorily the problem of introducing new goods. The consumer's preference map is given in terms of the original

> set of goods, and the new good requires that this be thrown away and replaced by a new preference map based on the new set of goods. All the information concerning preferences on the original set of goods is discarded in the process.[14]

The problem then is that, for purposes of assessing the demand for the new product, a great deal of relevant information is excluded from the analysis.

If the new good is of "a kind that possesses the same characteristics as the old, but in different proportions,"[15] then a demand model that is different from the standard demand paradigm can be used and, at least theoretically, overcomes the problem. This demand model is based on a characteristics analysis.[16] The preceeding discussion of the relevance of the characteristics of computer-communications services versus the output or end results of the service in a generic sense suggests that such a model is likely to be very useful for an analysis of the demand for computer-communications services. As Lancaster notes, "Almost all new goods have characteristics or perform functions similar to those of existing goods, but differently combined."[17] Computer-communications services appear to fit this description very nicely.

The model which Lancaster develops assumes that "the consumer's demand for goods arises from the fact that goods are required to obtain characteristics and is a derived demand."[18] Characteristics typically will be joint for any particular good; that is, typically a bundle of characteristics will be associated with a particular good. This assumption implies that "[a] single good may have more than one characteristic, and a single characteristic may be obtainable from more than one good."[19] It also means that "[g]oods which share a common characteristic may have their other characteristics qualitatively different, or they may give the same characteristics but in a quantitatively different combination."[20] Finally, the case also will be that "[g]oods in combination may possess characteristics different from those pertaining to the goods separately."[21]

From this notion of the characteristics of goods defining the demand for goods, it is possible to derive the notion of a "consumption technology,"[22] that is, consumption activities which produce various

combinations of characteristics. From this notion one can think in terms of consumption efficiency, a view which conventional demand theory does not include.

Introducing the notion of consumption efficiency into demand theory changes the nature of consumer choice into a two-part decision: first, consumers will make an efficiency choice, meaning that combinations of goods which do not achieve maximum attainable combinations of characteristics within some defined budget constraint will be rejected; second, consumers will make a private choice, based on preferences, of the exact combination of goods to be consumed from among the efficient possibilities, those combinations consistent with maximization of characteristics.

Consumers may act inefficiently in using any given consumption technology due to ignorance or mismanagement.[23] Therefore, the actual choice of goods made by consumers does not necessarily reveal their preferences for characteristics as implicitly assumed by conventional demand theory; it may represent an inefficient choice.

A new good introduced, granting that it possesses characteristics already available but in different combinations or proportions than existing goods, means, in effect, a change in the consumption technology. As is well known to be the case for a change in production technology, a change in consumption technology will be adopted; the new good will be used only if, barring mismanagement, its price makes it efficient to use. In other words, too high a relative price for a new good may prevent a market for the good from developing. If other goods or combinations of other goods can provide the same characteristics as the new good and do so at a lower price, rational consumers will not buy the new good. A new good, therefore, may fail to penetrate the market beyond some period of experimentation with the good because its price is too high. This result can occur before the question of consumer preferences is even considered. If the price of the good is low enough to put the good within the set of efficient combinations of characteristics, then preferences will determine how much of the good is bought within a given budget constraint. Thus, a low price, in relative terms, does not guarantee a market. Consumers' attitudes, level of satisfaction with existing goods, and specific

characteristics offered by the new good compared to the old will all influence consumers' preferences.

Applying the Lancaster Model

To apply fully the Lancaster demand model to the case of computer-communications services would require identifying the relevant characteristics of computer-communications services; identifying the relevant characteristics of alternatives to computer-communications services, both individual products and combinations of products; and assessing consumer preferences in relation to these two sets of characteristics.

The task would, in fact, be even more complicated than suggested given:

1. the large heterogeneity within the computer-communications services category, where different characteristics or different proportions of characteristics will be offered by different technologies and/or by different functional applications of the technologies;
2. the large range of products which would need to be considered as alternatives for delivering combinations of various characteristics, a task compounded by having to consider combinations of products rather than just individual products capable of delivering characteristics combinations;
3. the possibility, some examples of which are already well established in the market, that combinations of computer-communications services and non-computer-communications services may represent alternative combinations of products for achieving certain characteristics, thus further enlarging the range of alternatives to be considered. In other words, we cannot simply treat non-computer-communications services as substitute technologies to computer-communications services. In terms of characteristics, combinations of the two may be an efficient way of delivering a set of desired characteristics, for the technologies may be complementary in the context of certain specific applications/uses;
4. the possibility of complements within the computer-

communications services market; that is, different computer-communications technologies/services may not only be competitive with one another but also may be complementary;

5. the difficulty of assessing consumer preferences.

Placing all of these considerations together and attempting a detailed application of the Lancaster demand model is beyond the scope of this present exercise. Even if the task were to be considered, the necessary information on the entire range of products and consumer preferences is, in many cases, non-existent. In fact, further research in this area could be extremely valuable.

While a detailed application of the Lancaster model is not possible, the model, nonetheless, provides a general framework for our analysis from which a number of valuable insights can be gained. More significantly, it provides a basis for organizing the information that is available regarding the demand for computer-communications services.

Relevant Characteristics

The functional classification of services set out in the taxonomy developed in Chapter Two represents a first-level differentiation of the computer-communications market that allows an initial identification of some common characteristics. Further levels of differentiation are possible down to the level of the individual listings included in Table 2.4. For this analysis, however, the first-level differentiation will be used in order to keep the analysis within manageable proportions. For the moment also, the "capabilities" classification used in Table 2.4 will be ignored, however, the classification of "interactive" versus "consumptive" services shown in Table 2.4 will be used.

In the literature, a number of discussions of "important" characteristics of computer-communications services exist. Tydeman, for example, makes mention of content, convenience, ease of use, reliability and cost.[24] Tydeman also notes the importance of certain technical characteristics of the system such as transmission speed, error rate, graphic capabilities, terminal characteristics, distribution mode, and capacity.[25]

The Hickling-Johnston report mentions, with respect to Telidon, that "the network base, the interactive capability and the colour

graphics define the character of the Telidon medium."[26] Hickling-Johnston stress the networking characteristic of Telidon and the importance of content, where the content or information considered to be most important is that "where value can be placed on current information."[27] Hickling-Johnston also notes that "[this] information retrieval capability of Telidon-like products has, in our view, been over-emphasized . . . . In most of these cases, the information is reasonably readily attainable through other sources . . . . It is less than clear that serviceware which simply mechanizes what is now done offers high potential for the consumer."[28]

OCLC, reporting on its Channel 2000 project,[29] records several characteristics of viewdata; that is, videotex systems. These include: improved access to information; time savings in accessing information; convenience; locational independence; better use of discretionary time; more informed decision making; personalized service; ease of use; and "a reasonable price against competing systems."[30] The OCLC report also notes the importance of viewdata equipment being "nonintrusive and compatible with existing life-styles."[31] Overall, the evaluation of the test results emphasizes two primary considerations: ease of use and low cost.[32] In view of technical problems experienced by users, reliability is identified by users as an important feature.[33] The OCLC report also indicates that an important characteristic of computer systems is that "their capabilities for rapid update and communication of information prove ideal for serving topical, timely information needs."[34]

In the various interviews conducted as part of this present study, the importance of computer-communications systems for the delivery of timely information was stressed.[35] Representatives of the Financial Post cited several important characteristics of computer-communications services including timeliness; others were time, content, convenience, cost and immediacy.[36] Rogers Cablesystems commented that, based on the experience of trials conducted in Portland, Oregon, consumers "want something that is real in value terms, simple in operation and straightforward as to packaging, price, etc."[37] David Carlyle, speaking of videotex systems, emphasized the advantage of the simplicity of the system. Time Inc. placed a great

deal of significance on response time,[38] noting that available evidence indicates that a ten second response time is totally unacceptable to end users. A five second response has been found to be still somewhat questionable. A two and a half second response time is one which can be said confidently users will accept.[39] Time Inc. also stressed the importance of the ability to customize/personalize content with two-way videotex or what, in the taxonomy of Chapter Two, was labeled more generally as interactive services. This service, Time noted, represents a significant difference between two-way videotex and teletext. The latter can personalize only in the most general terms of letting the user select what he/she will receive or, in the case of multiple channel service, by particularizing the services offered on each channel. Thus, for example, there could be a news/weather channel, a sports channel, a consumer product channel, etc. However, the ability to call information up on demand so that the user can exercise the most complete control over content is most fully realized with an interactive system.[40]

The notion that the value of content will be the key to market acceptance was stressed in many of the interviews conducted.[41] Both in industry circles and in the literature, the lack of development of appropriate applications is generally perceived to be the greatest weakness of Telidon development in Canada to date. This fundamental conclusion also emerges from the Lancaster demand framework with its emphasis on the characteristics offered by products versus products as ends in themselves.

This discussion could continue to identify characteristics which are perceived, or have been demonstrated, to be important to consumer adoption or use of services from computer-communications systems in general or of videotex systems in particular. However, the major ones have already been identified. In no order of priority these are:

- speed of access
- timeliness of information
- convenience
- ease of use
- cost
- content

- value of content
- reliability
- error rate
- graphic capability
- colour capability
- capacity
- networking
- interactivity (for other than consumptive systems)
- personalized/customized service
- more informed decision making
- immediacy
- simplicity

When reviewing this listing, two distinguishable types of characteristics which are being mixed together become apparent: output characteristics which are attributes which are desired in their own right and are characteristics derived from the services, and technical characteristics which are attributes which improve the quality of the product or the product characteristics but which are not output characteristics in their own right. Table 3.1 duplicates the list provided above but divides the items into these two categories. Cost is included under technical characteristics because cost or, in conventional terms, price is a characteristic which will determine the available combinations of output characteristics attainable for a given budget constraint and will influence the user's preference or choice between different available characteristics sets but is not, itself, an output characteristic.

It is important to realize, the technical characteristics, while distinguishable from the output characteristics, may heavily influence the presence of output characteristics, either in absolute or relative terms. In other words, although the two are distinguishable, they are not independent. Simplicity and speed of access, for example, as technical characteristics, may heavily affect leisure-time consumption where leisure time is an output characteristic.

This latter example illustrates another important point about Table 3.1, a listing based on the literature and a series of interviews conducted as part of this study. Both of these sources are dominated by

Table 3.1
Characteristics of Computer-Communications Services Identified from Literature/Interviews

Output Characteristics	Technical Characteristics
content	cost
value of content; timeliness; immediacy	speed of access
personalized/customized service	networking
more informed decision making	interactivity (except for consumptive systems)
ease of use	error rate
convenience	graphics capability
reliability	colour capability
	capacity
	simplicity

persons involved in or with the computer-communications market. It is not unexpected, therefore, that these sources would have a bias towards technical characteristics and output characteristics which are somewhat ubiquitous in the sense that they are not specific to any functional application, nor to any particular service application or the commonplace needs of consumers/users.[42]

Thinking about output characteristics more carefully, several characteristics in addition to those in Table 3.1 can be identified as relevant, either in general or with respect to specific functions. Table 3.2 presents an illustrative list of these output characteristics together with those in Table 3.1. broken down between general and function-specific cases. It is important to understand not only that Table 3.2 is still not a definitive listing but also that the output characteristics are, even in the function-specific cases, still at a relatively high level of generality because the five-way functional classification is, itself, at a relatively high level of generality. To overcome this generality would require a more disaggregated classification, ultimately culminating at the level of individual service offerings.

Table 3.2

Illustrative List of Output Characteristics

General	Information Retrieval	Transactions	Messaging	Computing	Monitoring
- value of content	- information for a variety of specific needs	- acquisition of goods	- inter-personal communication	- management of personal affairs	- safety
- customized service	- health maintenance	- discharge of financial obligations	- political participation	- discharge of job obligations	- time-saving
- more informed decision-making	- personal well-being	- management of personal financial affairs	- community participation		- comfort
- non-intrusive	- learning	- specialized buying needs	- business correspondence		- peace of mind
- leisure (time savings)	- vocational needs				
- recreation	- well informed				
- entertainment	- management of personal affairs				
- ease of use	- political participation				
- convenience					
- reliability					

Table 3.3 draws on Larratt[43] to present an illustrative list of alternatives for computer-communications services broken down according to the five-way functional classification scheme introduced in Chapter Two. Because Larratt is considering Telidon versus all computer-communications systems, his original listings include some computer-communications alternatives to Telidon. Since we are considering all computer-communications services, Larratt's intra-computer-communications alternatives have been dropped in Table 3.3. In addition, Larratt considers only shopping alternatives under transactions; hence, some additional items have been added. He also does not consider non-computer-communications alternatives to monitoring or computing; therefore, some possibilities have been added for these two functional categories. As in the case of Table 3.2, it is emphasized that Table 3.3 is not a definitive or exhaustive listing of alternatives. It does, however, provide some useful illustrations of what some of the alternatives may be.

It is necessary to recognize that the types of alternatives shown in Table 3.3 are all existing goods or services. The characteristics of these existing goods relative to new computer-communications services will determine the level of market acceptance of the computer-communications services. This relative comparison may not be based only on the objective characteristics of goods as consumers' attitudes and perceived needs will greatly influence their preference function. If a technology offers superior characteristics which are undesired, the good will not be purchased. If consumers are perfectly satisfied or even relatively satisfied with existing goods, they may see no reason to change. Levels of satisfaction or dissatisfaction with existing goods will, in fact, be a major determinant of the success of new products in the market. In this sense, present satisfaction may act as a kind of barrier to entry for new goods; so, too, may attitudes to high-tech goods or uncertainty about performance or the characteristics of new computer-communications services.

A careful examination of Table 3.3 also reveals that, while all of the alternatives listed could be substitutes for computer-communications services, some of them might also be complementary. Stand-alone personal computers are a good example.

Table 3.3
Alternatives to Computer-Communications Services
by Functional Classification

Information Retrieval	Transactions	Messaging	Computing	Monitoring
Newspapers	Store purchases	Telephone	Stand-alone computer	Remote control devices
Magazines	Direct mail	Mail	Pocket calculator	In-house smoke alarms
Books	Telephone shopping	Telex	Word processor	Bell-type burglar alarms
Television: cable/broadcast	In-person banking	Mailgram	Typewriter	"Programmable" thermostats
Mail	Manual bill paying	Telegram	Manual calculation	
VCR's		Travel	Software manuals	
Videodisc		Couriers	Video game machines	
Reference libraries			Tape or floppy disc mounted software/ data	
Friends				
Associates				
Professionals				
Personal Programmable Computer				
Yellow Pages				
Business Directories				

Source: For information retrieval, messaging and part of transactions, R. Larratt, op. cit., pp. 67-69.

Hickling-Johnston, writing in 1979, viewed the personal computer as directly competitive with Telidon. They attached particular importance to the then just announced entry of Texas Instruments into the personal computer market:

> Telidon's ability to compete with this new generation of the personal computer will hinge on its ability to compete head on with Texas Instruments.[44]

This assumption is somewhat ironic given Texas Instrument's withdrawal from the personal computer market in 1983. This fact aside, however, the general proposition of a computer-communications system (Telidon) in head-on competition with personal computers is the relevant point of this quotation.

The Tyler forecast of demand for videotex and videotex-like systems, referred to at the beginning of this chapter, provides a good illustration of the alternative view of the personal computer/computer-communications services relationship. Tyler, it will be recalled, bases his projection of the growth of the videotex market on the projected growth of the personal computer market. In other words, he sees the two, at least with respect to household penetration and use, as complementary. Basically, his argument is that personal computers, by themselves, have a limited set of uses, for the average household user at least. Thus, the household which acquires a personal computer will quickly find that it is not being fully utilized and/or that the range of services it can provide can be significantly broadened/enhanced by equipping it with a communication capability and tying in to various computer-communications services. In addition, the cost of entering the computer-communications services field will have been significantly reduced because the terminal equipment (with perhaps the exception of a modem) will already be owned. Thus, as Larratt notes, "connection to data bases and electronic catalogues will have minimal add-on cost."[45]

One can envision the personal computer and various computer-communications services complementing one another in various ways: by augmenting the range of services for which the personal computer can be used; by providing a downloading capability for a computer-communications service to permit local processing, thereby reducing connect time charges or increasing the ease of use or convenience of

the computer-communications service; by creating an electronic delivery system option for the marketing/purchase of computer software; and so on. We will return to the issue of personal computers later in this chapter to consider more fully the relative merits of the personal computer as a standard terminal device for computer-communications services. For now, the above discussion should suffice to illustrate the general point of potential complementarity.

Table 3.4 describes a number of potential complementarities between computer-communications services and non-computer-communications services. Again, this is an illustrative listing, not an exhaustive or definitive listing. Again, however, it serves to indicate the range of complementary options which might exist.

With respect to Table 3.4, it should be noted that, as a general proposition, any information acquired through a computer-communications service may be complementary to some other communication activity. Table 3.4 concentrates primarily on complementarities with other information transfer modes and, hence, does not include examples of complementarities with other more general consumption activities. Possible examples of such complementarities would include the use of an on-line cookbook in preparing a meal, the use of weather information by a farmer to schedule planting activity, the use of political profile information as an aid in voting, and so on. In all of these cases, the computer-communications service is serving as a substitute for some other information transfer technology but is complementing some other consumption activity to which the information is an input.

Table 3.4 also illustrates the point in the Lancaster demand model which emphasized that the characteristics possessed by a combination of products will differ, in kind or degree, from any of the products taken individually. This point is immediately obvious with even a cursory consideration of the characteristics of the listings included in Table 3.4 versus the constituent parts of the combinations shown. It must be emphasized, however, that the characteristics of the combined package necessarily represent a superior combination in efficiency terms.

Table 3.5 completes the discussion of characteristics and

Table 3.4

Complementarity Options for Alternative Technologies

- data base connection to personal computer
- mail delivery of library books borrowed on-line
- delivery (mail or transport) of merchandise borrowed on-line
- downloading of software to personal computer
- computer to computer "conversations"
- in-person pick-up of items ordered on-line
- telephone or mail ordering of products described on-line
- purchase of goods after comparison shopping on-line
- telephone response to polling questions delivered on-line
- off-line processing of information delivered on-line
- mail forwarding of messages to parties not accessible on-line
- stock transactions off-line based on on-line stock/financial information

Table 3.5

Complementarities Amongst Computer-Communications Services

1. Information retrieval and transactions
   - e.g. the use of comparison shopping results to make an on-line purchase
2. Information retrieval and messaging
   - e.g. passing on, via electronic messaging, information received on-line
3. Transactions and messaging
   - e.g. making an inquiry to your bank regarding the balance shown for your account
4. Information retrieval and computing
   - e.g. on-line processing of information obtained on-line
5. Information retrieval and monitoring
   - e.g. access to an emergency health procedures data base triggered by a health monitoring system
6. Transactions and monitoring
   - e.g. automatic ordering of heating fuel based on readings from an energy monitoring system.

competing/complementary technologies by considering complementarities within the class of computer-communications services. Table 3.5 is expressed in relatively general terms of functional categories with a specific example provided to illustrate the complementarity. It should be noted that in cases where different system operators provide individual services, some of these complementary packages might be harder to realize, and this result, in itself, would become one of the characteristics of the combined package. Even without different system operators, to realize some of these packages might require the further addition of a local computer and a downloading capability on the service itself.

The taxonomy developed in Chapter Two contained a capabilities classification in addition to a functional classification. Specifically, services were classified according to three capabilities: amplification of cognition, regulation of affect and communication/control. Each of these capabilities may be viewed, in the content of the demand model of this chapter, as representing a combination of characteristics similar to those shown in Table 3.2. For simplicity, no separate listing of characteristics related to these capabilities is offered.

While the preceeding discussion of characteristics and substitute and complementary technologies has been illustrative rather than definitive, it is sufficient for us to proceed to analyze the implications in terms of the Lancaster demand model.

Cost Considerations

The cost of a product, or price, enters the model in terms of defining maximum attainable combinations of characteristics, having specified the characteristics possessed by each product under consideration. When a new product is offered to the market, its consideration for purchase will be based both on the characteristics possessed by the goods, the proportions in which the characteristics are present and the quantities of the characteristics that can be secured, which will be a function of the price of the product for a given income or budget constraint. The higher the price of a product and the smaller the level of characteristics that can be obtained, all other things being equal, the weaker the new product will be as a substitute for existing products in efficiency terms.

For computer-communications services several elements of cost must be considered and an important distinction made between first-time entry to the market versus the addition of an extra service by a consumer who is already in the market. Also, an important distinction must be made between cash-costs, payments made to other parties, and implicit costs. Implicit costs include such things as the time required to use the service, the time and effort of learning to use the equipment and the service, and so on. These implicit costs may be very important. Although the following discussion will focus on cash-costs, the potential importance of implicit costs should not be ignored. If high enough, the implicit costs could represent an effective barrier to entry.

The cash-cost elements involved in computer-communications services are the cost of hardware, the cost of the service and the communications cost.

The hardware cost will involve the cost of a display unit, a decoder, a communication box and a keyboard or keypad. The display unit cost may be negligible if an existing TV set is used for this purpose. In this case, the cost will be only an opportunity cost of lost television viewing time. This result may not be insignificant, however, given different preference functions of family members. Hence, it is not unreasonable to expect that some users, at least, may want a dedicated display unit, either a second television set or some other form of monitor. Noteworthy, however, is the factor that many households may already have more than one TV, thus largely eliminating this problem.[46] This advantage may be minimal in that the display capabilities of most colour television sets may not be suitable for many computer-communications services. The display unit cost, though, will be a start-up cost only. The decoder, communication box and keyboard/keypad may or may not be a one time start up cost, depending on whether the system operator packages the service so as to require a dedicated terminal device. In this case, the cost will be attached to any service add-on, except those purchased from the same vendor, not just to the first time entry. This cost creates a strong argument, from an overall market development perspective versus the perspective of an individual service provider, in favour of standardization of terminal equipment, which has been true for some time for ASCII based services but not

videotex/teletext services. The adoption of the NAPLPS standard for videotex, now accepted as the industry standard, should partially overcome this problem. System operators can still require dedicated terminals through other means, however, and, in itself, NAPLPS does not make standard ASCII terminals compatible with videotex terminals.

A very important point to note is that, if and when terminal devices for the computer-communications mass market converge on the personal computer, the terminal cost and, perhaps, the display unit cost[47] will disappear or at least will be reduced in significance, in terms of the start-up or add-on costs of computer-communications services. They will disappear if the decision to buy the personal computer is justified independent of the value of adopting computer-communications services. In this case, the computer-communications services will be add-ons which, at most and for the first time only, will involve the cost of a communications modem and either a hardware peripheral for certain production technologies like videotex or software which serves the same purpose. Personal computers could, however, ultimately have both of these features built in. Already a trend to equip personal computers with a communication capability has begun. For the case where the purchase of the computer is independent of the adoption of computer-communications services, the latter is a complementary technology which becomes an add-on to the characteristics set under consideration. Where the purchase decision for the computer and for the services are interdependent, then one begins with a complementary product bundle, the full cost of which must be taken into consideration when considering efficient consumption combinations. The bundle will, however, be an enhanced one in this case, offering characteristics for the combination greater than for either of the parts taken individually. Thus, the hardware cost will, in some sense, be spread out, making the impact on computer-communications services less than if they were considered singly. All of this discussion assumes that the personal computer is compatible or can be made compatible with the service in question.

It is possible to speculate that one of the reasons why the forecasts of Telidon adoption referenced at the beginning of this chapter have been so far beyond actual adoption is, in part, explained

by the hardware costs seen in the context of our model. First, Telidon terminals have been dedicated units up to this point in that users require the terminal/decoder of a particular service to receive that service. Second, they have been dumb terminals in the sense that, while they have a processing capability or a CPU (central processing unit), it is limited and, most importantly, hidden from the user; it cannot be programmed by the user. Third, they have been relatively expensive. A Telidon terminal, which lacks the additional capability of a personal computer, still sells for a price which is at or above the price of many personal computers. Though prices for them are expected to fall, prices for personal computers are also expected to fall.

The important point to recognize is that a dedicated terminal unit offers far more limited characteristics than a universal unit and a dumb terminal more limited characteristics than an intelligent, programmable terminal. The combination of a dedicated dumb terminal in comparison with a standardized, intelligent, programmable terminal simply cannot win unless its price is significantly lower. But the price for a Telidon terminal has not been significantly lower. It is not likely sheer coincidence that the two largest "general public" computer-communications services, The Source and CompuServe, with over 50,000 and 100,000 subscribers respectively, are services which are compatible with any ASCII terminal device and, thus, have been able to take immediate advantage of the recent growth in personal computer sales in North America.[48]

The price of computer-communications services is the second component of cash-costs identified. A variety of pricing schemes are theoretically possible for computer-communications services. First, price may be of a flat rate subscription variety, with unlimited usage. Second, it may be of a time sensitive variety (generally referred to as connect-time charges) with or without a minimum charge attached. Third, it may be both a subscription fee plus connect charge system. Fourth, it may have a subscription fee with unlimited usage for some core of services and add-on charges for either individual items or for further layers or tiers of service. Fifth, it may be wholly usage-sensitive based either on time, volume, content or combinations of these services.

Examples of all of these options are found in the market at present. There are a number of specialized on-line data base services which use usage-sensitive pricing. A new service offering, incorporating a combination of time and content charges, introduced in 1984 by the Financial Post, is one example.[49] The NABU Network is an example of a tiered subscription-based service.[50] There is a core service to which users must subscribe for a fixed monthly fee and for which usage is unlimited. A number of horizontal tiers[51] can then be added, each on the same basis, fixed fee and unlimited usage. Viewtron, the Knight Ridder videotex service in Florida, is a flat rate subscription service with unlimited usage. CompuServe and The Source are both connect-time charge systems. The Source has a few items with add-on charges. CompuServe offers an Executive Information Service, as well as their more general Consumer Information Service, where both connect-time charges and content charges apply.[52] Both The Source and CompuServe have a minimum monthly billing; a charge levied against subscribers whose connect time charges are less than the minimum.

The particular pricing scheme attached to a service will be one of the characteristics of the service which will differentiate the product and influence consumers' purchases. There seems to be a general consensus among industry representatives in Canada that, for households, a flat rate, subscription based system offering at least some core of services with unlimited usage, is, or will be, the preferred pricing system. This opinion was expressed by Rogers Cablesystems, Infomart, David Carlyle, NABU, and others.[53] How attractive this characteristic is will depend in part on actual usage patterns. For major users or for users of particular items which involve time-intensive use (e.g. games), such a pricing scheme is very likely to save them money over a usage-sensitive scheme. For light users or for users of "quick consumption" items, items which take little time such as checking the weather, this scheme may not be satisfactory. The major determinant of the advantages of this type of approach to users will, however, be the level of the fixed subscription fee. The higher the fee is, the more likely that average and below average users will prefer some usage-sensitive scheme, although the particular form of

sensitivity charging and the level of usage charges will clearly influence this trade-off. Nonetheless, it would appear to be implicit in the argument that flat rate fees are preferred by subscribers that the level of fees is also relatively low. Two other characteristics of a non-usage-sensitive pricing scheme, that is, a flat rate subscription fee scheme, are: it eliminates uncertainty over cost for the user, a characteristic consumers might well value even if they do not always use the equivalent of the fee; and it allows/encourages browsing, another characteristic which some users might value positively.

The notion that mass market services must be cheap, is a conclusion held by many industry observers/participants. Indeed, as noted in Appendix A, some observers include low prices as part of their definition of the mass market. The demand model employed here, however, questions this assertion as a necessary condition for the mass market.

Undoubtedly, it is true that the lower the price of a product, the more affordable it will be to more people and/or the more of the product the same people will be able to consume. Affordability, a slightly different issue, is examined below. For a given level of income, as long as prices are consistent with that level of income, the prices which consumers will accept will depend on the characteristics of the product and how much those characteristics would cost if obtained from alternative products. A corollary of this conclusion is that the broader the range and depth of characteristics offered by a product, the greater will be the substitution possibilities and, for a given set of prices for substitute products, the greater will be the proportion of a user's income which may be devoted to computer-communications services and the higher the price which users may be prepared to pay. This conclusion is not an argument for an upward sloping demand curve. What must be remembered is that a computer-communications system encompasses both a bundle of products (services) and a bundle of characteristics. The substitution possibilities may, depending on the specific service offerings of the system, extend across a number of budget categories for individuals or households,[54] not to mention businesses, which are included in our definition of the mass market.

This discussion does not deny the proposition that a mass market

will more likely emerge with lower prices for computer-communications services. What it does do, however, is underline the conclusion that the value of the services, expressed in our model in terms of desirable characteristics, will be (for a given level of income) the ultimate determinant of acceptable price levels. When we recognize the full range of substitution possibilities, the enhanced characteristics bundles arising out of complementarities where these are found and the need to consider the cost of alternative products capable of delivering the same range/proportions of characteristics, it is not as clear that low prices are a necessary condition for a mass market to be realized.

The third cost component identified earlier was communications cost. Major discussion will be found in Chapter Four, where carrier or distribution alternatives will be examined. For now, only a few general observations will be made:

1. communications costs may be a significant operating cost element where communications are by telephone and, from the users perspective, are not strictly local;
2. packet-switched data networks make the long distance communications costs implications for telephone based systems relatively minor for users with local access to a packet-switched network;
3. communications costs may bias user access to a telephone based computer-communications market towards residents of major urban centres (which are most likely to provide local access to the packet-switched network) and, on the producer side, towards local service providers versus national;
4. the flat rate, unlimited usage, local calling price structure now in place for telephone service in Canada encourages development of the computer-communications services market, all other things being equal; by the same token, the introduction of local measured service (LMS) could discourage development;
5. present cable system technology makes telephone based systems the only present viable alternative to consider for fully interactive services. Thus, observations 1-4 represent legitimate concerns over the near- to medium-term for Canada.

Other Characteristics

Within the framework of our model, if we examine some of the other characteristics of computer-communications services identified in Tables 3.1 and 3.2, some further interesting conclusions emerge. First, the personalized/customized service characteristic is one which stands out as potentially very important. The ability to tailor or target content to specific audience groups is emerging as the dominant marketing focus of computer-communications systems. Sometimes referred to as narrowcasting,[55] this approach has long been the basis of business-oriented services and is now regarded as the most promising approach for general public oriented services as well.[56] The ability to focus content is greatest with interactive services but is also possible, to a lesser degree, with consumptive services, whether delivered via a two-way or a one-way distribution system. Some interactive services have even been designed to deliver personalized service at an individual level rather than merely a group level.[57] The desire for customized service is regarded by some observers as a general societal phenomenon which technological change is increasingly making possible. Toffler, for example, maintains that ". . . the essence of Third Wave manufacture is the short run of partially or completely customized products . . . Autos, T-shirts, and many other products represent a halfway stage between mass and de-massified manufacture. The step beyond this, of course, is complete customization—the actual manufacture of one-of-a kind products. And that is clearly the direction in which we are heading: products custom-cut for individual users."[58] Toffler is focusing on manufacturing, but the same observation can be made about a variety of products. Television, for example, with the multi-channel capability created by cable television technology, is becoming increasingly specialized with separate channels devoted to news, sports, movies, etc. Movie theatres are following a similar trend; individual viewing rooms are becoming smaller and the number of viewing rooms, movie selections per theatre, is quite commonly more than one and may be as high as twenty or more. Computer-communications services have a tremendous technological ability for customization and the evidence from various sources suggests this to be an extremely important characteristic to exploit re consumer adoption. As noted in Chapter

Two, a mass market is not necessarily defined by mass production; indeed, for computer-communications services, just the reverse may be true.

Second, graphics and colour capability are distinguishing characteristics between various computer-communications services but their value is open to question. Both of these characteristics have been particularly stressed for videotex systems and, in particular, for Telidon. But, for straight textual material which represents most of what is contained in information data bases, it is not clear that these characteristics are important.[59] It is noteworthy that CompuServe and The Source have, up to now, gotten by without either characteristic.[60] As David Carlyle has indicated, "Many people argue that users do not need graphics and colour. This may in fact be true. The point is, from a marketing stance, it is the IP who needs it because the graphics and colour will permit more effective selling."[61] This notion introduces a whole new line of thought into our analysis: advertising. For certain transactions services, graphics and colour may be very desirable attributes from the user's perspective; and for direct selling activities advertising is both expected and necessary. Beyond this, however, it is questionable whether the colour and graphics capability of computer-communications services at present, including Telidon, which is regarded as the most superior system in this regard, is capable of effectively competing with conventional advertising media such as TV and magazines. More importantly, the essence of computer-communications services is to allow the end users to see what they want when they want it. By definition this end does not permit hard selling or pressure to be exerted on the end user. Even given some trade-off with price, the user is not likely to be willing to accept very much in the way of sponsored content.[62] One of the other characteristics of computer communications services identified in Table 3.2 is its non-intrusive qualities. Advertising is potentially at odds with this[63] concept and, given Carlyle's argument, so are colour and graphics if they are justified on the basis of advertising. Part of the consumer appeal of pay-TV is the elimination of the intrusive element of TV advertising. Beyond transactions services and product information services, the place of advertising in computer-

communications services is not clear. More will be stated on this matter in Chapter Four.

Third, transactions services offer some of the potentially highest value characteristics, in terms of convenience, time savings, energy savings (from travel substitution) and so on. Present lifestyle issues in terms of two-worker families,[64] energy prices, individualism and material expectations re-enforce the value of these characteristics. From a marketing point of view, these characteristics become a focus for selling effort, and transactions services become a potentially important wedge for inducing first time entry to the market. The point has already been made of the value of focused applications. Transactions services are a particular way of implementing this strategy which has a particularly high expected return. A number of industry observers/participants believe that transactions services constitute the highest potential source of value for users while information retrieval offers perhaps the lowest, at least in the perception of first time entrants to the market.[65] While this view is not universally held,[66] it is the prevalent view. If true, the view implies that early development of mass market services, in particular residential-based services, is more likely to succeed if it includes a well developed transactions capability, both in terms of breadth and depth. A transactions emphasis will mean introducing a bias in favour of interactive systems versus consumptive systems and more involvement of retail service firms such as banks, department stores, etc.

Fourth, reliability as a characteristic potentially introduces a bias towards consumptive systems delivered by cable or broadcast mode. An interactive system, which means a telephone-based carrier system given present delivery technology, is subject to a capacity constraint; broadcast systems are not. The latter works on a cycle which provides the same feed to everyone and is insensitive to the number of users. This cycle is not the case with the former. The problem is present at two different levels. First, too many users may overload the local telephone switched network, preventing connections from being made and/or breaking connections which have been established. Second, the number of communication ports provisioned on the system itself may be insufficient to handle demand at any given time. To overcome this

consequence, capacity must be sufficient to meet peak-load demand, thereby adding to costs and creating a bias, all other things being equal, towards broadcast systems. Not increasing capacity creates a greater probability of connection problems and delays in response time, thereby affecting the reliability and, hence, usage of the system. Again the result will be a bias towards broadcast systems. On the other side, of course, the more limited functional capability of broadcast systems, which, in general, are largely consumptive systems, means there is a bias in the opposite direction. This bias will be particularly true given the preceeding argument regarding a transactions focus. The choice between characteristics present in different proportions will ultimately be decided on the basis of preferences not efficiency.

Market Characteristics

One final area of relevance to demand has not yet been touched upon in any detail—market characteristics.

It has been implicit, if not explicit, in the analysis of this chapter that consumer/user preferences will play a large role in the ultimate success of computer-communications services, the form as well as the content of services will matter, targeting or customized applications means catering to identified needs of identified groups and a basis for classifying user needs and of disaggregating the market into identifiable user groups must be established.

The latter task is both easy and hard. For business oriented services, it is relatively easy to identify user groups along industry lines (e.g. agriculture, real estate, travel agencies) or professional lines (e.g. lawyers, doctors, investors). Identifying specific service needs for these groups may not be as easy and will require, in some cases, vision and persistence.[67] Nonetheless, focused business applications are regarded now as being the base on which a mass market will ultimately be built.[68] Such applications will establish a user base, are more likely to be profitable quickly, and will have a complementary influence on the use of services in the home.[69]

Regarding the home market, the situation becomes far more difficult. In part, because of high entry costs, there has been a tendency, in looking at the residential market, to focus on middle to

high income users.[70] This tendency has been re-enforced, to some extent, by the higher prices required to support services (in some cases, in terms of minimizing losses) while market size, hence sales, are still small. An implicit policy question therefore, is whether the "public good" is best served by a focus on the more affluent segments of society and whether such an emphasis will widen the so-called information gap between rich and poor.[71]

Early general public services such as CompuServe and The Source catered to a large extent to so-called computer hobbyists. The personal computer market is broadening, however, and the characteristics of personal computer owners are changing as a result. Whereas computer hobbyists are generally computer-literate, many of the newest generation of personal computer owners are only what might be described as semi-literate. The personal computer market still represents a very obvious target population to focus on in the residence market, but the needs of this group are far more heterogeneous than, say, even five years ago, and, thus, the applications/services needed to serve this group require far more careful consideration.

One of the outcomes from the implications of more users who are no more than semi-computer-literate, both for personal computer based systems and non-personal computer based systems, is that the search for user-friendliness, systems requiring a minimum of technical knowledge and understanding to operate, has intensified. This action may be important because it may have the side-effect, in many cases, of limiting the breadth or depth of the system and/or of limiting the range of operations that can be performed. Even though people may not know how to use sophisticated systems or may be intimidated by them, they may still want the operational characteristics and the results that only sophisticated systems can provide. User-friendly innovations which make services easier to use without limiting the end-characteristics of the service will continue to be desirable. Even for the highly computer-literate user, such innovations may offer considerable savings in time and convenience. But when user-friendliness means simplifying the operation in such a way as to reduce the capability/results of the service, the outcome poses a different question. In Canada, much emphasis has been placed on videotex as a

user-friendly system and in designing videotex systems to play this role. This focus has meant, however, offering only a keypad versus a full keyboard and using a tree-index structure for the organization/retrieval of the data base. Such features can be frustrating, cumbersome and overly restrictive. The gains in simplicity and ease of use are more than offset by losses in other desirable characteristics. What may be most ironic, however, is that a whole new generation of computer-literates is in the process of being produced by an educational system re-enforced by video games and other electronic gadgetry. Just when user-friendly systems for the computer-illiterate become perfected, they may no longer be required or wanted.

As an aside, it is worthwhile commenting on education itself as a target audience for service development. Computers are making major inroads in the educational system. But, for the most part, they are operated on a stand-alone basis. Networking is perceived as desirable and even takes place on a limited scale. In the future, distance-education using computer-communications technology may become an important delivery mechanism for university and adult education offerings. However, for the public school system, networking, other than perhaps local area networking, is not likely to grow to any significant extent because of limited budgets and communications costs.[72] Computer-communications systems using a broadcast distribution and downloading for local processing may develop.[73] In general, though, educational applications of computer-communications systems (versus computers) are likely to be most important as part of residential based services rather than services to the school system.

Conclusion

In terms of the overall demand analysis of this chapter, a number of important implications for market development have been generated. To assess fully the significance of these, however, requires an examination of the supply side of the market and a joint consideration of both supply and demand. In Chapter Four, supply determinants are examined, and Chapter Five goes on to look at scenarios of market development, based on the analyses of Chapters Three and Four. Perhaps the most important conclusion to emphasize from the demand

analysis of this chapter is the need to look at computer-communications services in terms of their characteristics—in terms of what they will do for and the value they will deliver to users relative to competing or alternative technologies.

Notes

1. Hickling-Johnston Limited, Field Marketing Trial Strategy for Telidon (Toronto: Hickling-Johnson Limited, 1979).

2. Ibid., Exhibit 4.

3. Ibid., Exhibit 4.

4. M. Tyler, "Market Projections for Personal Computers and Electronic Publishing," Context, Report Six, December 1980. Referenced in R. Larratt, "Market Factors" in D. Godfrey and E. Chang, op. cit., pp. 70-74.

5. Larratt, op. cit., p. 73.

6. Hickling-Johnston, op. cit., p. 6.

7. R.W. Hough and Associates Limited, A Study to Forecast the Demand for Telidon Services Over the Next Ten Years (Ottawa: Roger W. Hough and Associates Limited, 1980).

8. Ibid., p. 59.

9. Ibid., p. 78.

10. Ibid., p. 80.

11. Ibid., Table 17, p. 81. The upper bound of 150,000 actual subscribers assumes a monthly cost of service of $6.

12. Tamec Inc., Videotex Services: The Market Potential for Cable (Montreal: Tamec Inc., 1979).

13. Ibid., p. 110.

14. K. Lancaster, Introduction to Modern Micro Economics (Chicago: Rand McNally, 1969), pp. 218-219.

15. Ibid., p. 219.

16. This model has been developed by Lancaster. See Lancaster, op. cit. and also K. Lancaster, "Change and Innovation in the Technology of Consumption," American Economic Review, 56, 2, 1966, pp. 14-32 and K. Lancaster, "A New Approach to Consumer Theory," Journal of Political Economy, 74, 2, 1966, pp. 132-157.

17. Lancaster, Introduction to Modern Micro Economics, op. cit., p. 219.

18. Lancaster, AER, op. cit., p. 14.

19. Ibid., p. 15.

20. Ibid., p. 15.

21. Lancaster, JPE, op. cit., p. 134. As an example, a combination of a dishwashing detergent and a hand lotion offers characteristics which neither good offers separately. This conclusion is important to recognize because it means that, from a characteristics point of view, the two goods considered together represent a perfect substitute for a good which is both a dishwashing detergent and a hand lotion while individually they do not.

22. For a formal proof of this derivation see Lancaster, JPE, op. cit.

23. Lancaster notes on this point, "The consumer may not be aware that a certain good possesses certain characteristics or that certain goods may be used in a particular combination to give a specified bundle of characteristics. Producers or sellers may use advertising to ensure that no characteristics of their product regarded as particularly desirable should go unnoticed by consumers. They will go to less pains to ensure that consumers are aware of some other characteristics of their product." (AER, op. cit., p. 18).

24. Tydeman, op. cit., p. 62.

25. Ibid., pp. 49, 63-64.

26. Hickling-Johnston, op. cit., p. 3.

27. Ibid., p. 12.

28. Ibid., p. 12.

29. OCLC, Channel 2000 Project Report (Dublin, OH: OCLC, 1981).

30. Ibid., pp. 2-3.

31. Ibid., p. 10. One of the non-intrusive features noted in a negative way was the feeling that 50 percent of users did not like having their phone tied up. Only 11 percent objected to the television being tied up (p. 16).

32. Ibid., p. 15.

33. Ibid., p. 16.

34. Ibid., p. 20.

35. This point was made, for example, in personal interviews with the Financial Post and with Time Inc.

36. Personal interview, Financial Post.

37. Personal interview, Rogers Cablesystems.

38. Response time refers to the time which elapses between a user's request for a particular piece of information and the appearance of that piece of information on the user's monitor.

39. Personal interview, Time Inc.

40. Ibid. This point was also stressed in several other interviews.

41. This point was made by McGraw-Hill, GTE Telenet, Infomart, Time Inc., Financial Post and others.

42. Larratt, op. cit. notes, with respect to this point, "In simple language: consumer information needs are related to everyday life situations, and people turn to various information sources, personal, institutional, and media, to find answers. The consumer relates the information need to the situation, not to the source of the information" (pp. 48-49).

43. Ibid., pp. 67-69.

44. Hickling-Johnston, op. cit., p. 18.

45. Larratt, op. cit., p. 74.

46. This reason in the Channel 2000 case was advanced to explain why participants did not like having their phone tied up by the service but did not object to having a television tied up. See footnote 31 for this chapter.

47. This outcome will depend on whether the personal computer has its own display unit or uses the TV set for this purpose.

48. Personal interviews, The Source and CompuServe. Both of these services experienced major growth in 1983, in both cases virtually doubling their subscriber base. Very noteworthy is the fact that the majority of new customers are personal computer owners.

49. Personal interview, Financial Post. The interview took place in the late fall of 1983, at which time the service was planned for 1984.

50. Personal interview, NABU.

51. Horizontal tiers, as used here, means that there is no hierarchy to the tiers after you pass by the first one.

52. Promotional material supplied by CompuServe and The Source.

53. Personal interviews, Rogers, Infomart, David Carlyle, and NABU.

54. Demand forecasts such as Hough, op. cit. assume, mistakenly, that Telidon systems must be paid for entirely from the income devoted to "recreation, reading and entertainment," in the case of information retrieval services and games and "communications" in the case of messaging services. (Table 10, p. 67)

55. See Larratt, op. cit.

56. This point was stressed in a number of interviews conducted as part of this study with industry representatives/observers.

57. A new pharmaceutical information service offering by GTE Telenet, for example, contains a profile of each doctor with access to the system. When the computer identifies the user, it "tailors" the drug information to the doctor's particular medical specialization.

58. Alvin Toffler, The Third Wave (New York: William Morrow, 1980), pp. 197, 199.

59. This point was made in several interviews conducted for this study.

60. Both of these companies do, however, have colour and graphics under consideration.

61. Personal interview, D. Carlyle.

62. Many of these points were raised in a personal interview with Time Inc.

63. The Source asserted in a personal interview that it would be improper to impose advertising on users who are paying for their use of the system and hence have the right to see only what they want.

64. This point was made in a personal interview with NCLIS. The proliferation of catalogues, mail-order shopping, TV-specials etc. was attributed in part to the fact that as more women enter the labour force they have less time to spend on traditional activities such as shopping or banking.

65. This point regarding transactions services was made in several of the personal interviews conducted.

66. Rogers Cablesystems, for example, in a personal interview, discounted the potential role of transactions services and argued instead that monitoring services were a more likely "entry wedge" to opening up the market. Given the one-way limitation of present cable technology and hence the lack of a fully developed transactions capability, which requires an interactive system, this is, perhaps, neither a surprising nor an unbiased position.

67. When Mead Data introduced LEXIS, a legal information system, it was derided and the service, in general, was written off by most industry observers as having no chance to succeed. LEXIS went on to become one of the most successful and profitable information systems in the world. Mead saw the opportunity and persisted when others might have given up.

68. See, for example, Larratt, op. cit., p. 22.

69. These points were made in various personal interview sessions.

70. This is true, for example, of the NABU Network where the target audience has, among other attributes, above average income. (See footnote 32, Appendix A.)

71. OCLC, op. cit., p. 2.

72. Personal interview, TV Ontario.

73. Such a system is being developed by TV Ontario.

4: SUPPLY DETERMINANTS

The supply side of the computer-communications market encompasses all aspects of the production of computer-communications services. As such, it includes the provision of information, the creation of data bases, data base storage, service offerings and marketing activity and distribution. It also includes the hardware used to produce and to use the services.

From the vantage point of market development, the important supply side issues include, hardware options/choices, service packaging/content, financing, pricing, competition/structure, marketing and carrier options. These issues will be examined in this chapter.

Hardware

Aspects of the hardware issue have already been introduced in previous chapters. In particular, three major dimensions of the issue have been identified. These are:

- the use of dedicated terminal equipment
- standardization/compatibility of terminal equipment and the potential convergence of the terminal market towards the personal computer
- the price of terminal equipment and the impact of this on the initial entry decision of consumers to the market.

As noted in the previous discussion, if system operators continue, as videotex system operators have to this point,[1] the tendency to require a dedicated box or terminal for their service, overall market development is likely to be impeded, even though, in the short run, the system operator may gain. The advantage of a dedicated box for a system operator is that it locks in users.[2] Precisely for this reason, overall market development will be slowed down because hardware costs will be part of the cost of any add-on service unless the service comes from the same system operator. The ability to expand the overall market more quickly once an initial user base has been established will be lost. Users will very quickly, perhaps even after just the first one, begin to find the proliferation of terminals intrusive. What will serve their needs best is one all-purpose terminal with which they can access any service of their choice. Until the market provides this, market growth will suffer.

Part of the success of on-line specialized data base services has been the ability of systems to interface with almost any terminal using ASCII code. But, terminal machines still cannot necessarily "talk" to one another. A common standard for graphics has only just emerged with the wide-scale acceptance in North America of AT&T'S NAPLPS graphics protocol, a slightly enhanced version of the Canadian Telidon protocol. The problem of standardization is not just one of protocols, however. It is also a function of compatibility of components so that users can build a system over time;[3] it is a function of system software, something that system operators, not equipment manufacturers, must solve; and it is a problem of functionality, what the machine will permit the user to do, something which the emergence of personal computers as the standard terminal device and the notion of add-ons will help to overcome.

As long as hardware manufacturers continue to try to make unique terminals, an equipment problem will remain. Ultimately, it may be expected that the market will force standardization/ convergence of terminals if one terminal device or type of terminal device becomes dominant in terms of market share. If this occurs, others will be forced to conform in order to maintain their own market share. Apple and the IBM PC appear to be starting this process

for the personal computer market.[4] Add-ons, either in the form of software or hardware peripherals, are also emerging to give the personal computer videotex capability,[5] radio-delivered teletext capability,[6] and so on. The price of telephone modems is falling, making it cheaper to give a personal computer a communications capability. These trends, coupled with the emerging standardization of the personal computer field itself, may suggest that a tendency towards focusing the computer-communications market in general around the personal computer as the primary terminal device is already underway.

The price of terminal equipment has been, and still is, regarded as an impediment to market development of videotex and other computer-communications services.[7] This problem particularly has affected videotex in Canada where decoder boxes currently sell for between $1200 and $1700, and specially built TV monitors, which have built-in decoders, cost around $2000.[8] If and when market growth allows economies of scale in production to be achieved, these prices are expected to drop significantly. In the meantime, however, videotex decoders are going up against personal computers at prices which are the same or higher and at the same time offer far more limited capability than personal computers. For approximately $300, software to give a personal computer videotex capability and, hence, access to videotex services can be obtained.[9] Before economies of scale in production are achieved, the dedicated videotex terminal may be forced out of the market. Even if production volumes grow and unit costs fall as a result, personal computer prices are also likely to continue to fall and the issue of the different capabilities of the two alternatives will still exist. As noted in Chapter Three, the greater capability of the personal computer means that no single function necessarily has to justify the purchase of the machine by itself. This advantage could be one of the most significant in the computer-communications market convergence on the personal computer as the standard terminal device.

Competition

The issue of competition has a number of dimensions, two of which are particularly relevant here: the number of service providers or system operators that will exist and the level of market integration which should be permitted.

The number of service providers or system operators in the market, that is, how many producers, could influence market development in several different ways. First, the greater the number of service providers the greater the variety of service offerings there are likely to be and the more individualized those services may be. Choice and customized services are both characteristics likely to be valued by users. Second, competition in the market place is, in general, a healthy condition, especially from the consumer's point of view. Competition can be expected to keep prices down, which in itself will aid market development, and to make system operators more sensitive to users' needs and to factors such as quality and reliability. Third, competition could spur further technological advances in the field.

On the other hand, too much competition could fragment the market, preventing any one system operator from achieving efficient size in terms of realizing economies of scale, economies of scope, or being better able to spread the relatively high fixed costs of these systems over a greater number of users.[10] These economies would all tend to support lower prices; the failure to realize them would, thus, exert an upward pressure on prices. Second, to get the mass market started, it may be necessary to bring the resources available for these systems together, thus creating a single producer with sufficient resources both to develop and produce appropriate services and to weather the initial period of market development.

Hickling-Johnston, in their 1979 report, made a proposal along these lines in suggesting that the government should seek the establishment of "The Telidon Consortium, Inc.," a shared undertaking between government and the private sector, the purpose of which would be "the successful commercial exploitation of the Telidon product, first in Canadian markets, and ultimately in international mass markets . . . "The Telidon Consortium Inc. would have exclusive rights to the Telidon product, it would . . . seek to coordinate the efforts of manufacturers, networks, software developers and serviceware developers so that a fully integrated Telidon product emerges."[11]

Larratt has also suggested a similar move:

> What if the Canadian government "Petro-Canned" Infomart . . . Imagine such a company, called, perhaps, the General Telidon Systems Corporation. As an unshackled

> company, it would likely be able to raise $50,000,000 in a public equity offer. Add to that Norpak with the $30,000,000 it has recently obtained via Noranda, cable-oriented Nabu Manufacturing with maybe another $20,000,000 and surprises are possible.[12]

While these two proposals are not identical, their similarity would push the market in the same direction. Would such a strategy work?

It is important to realize that both proposals are Telidon/videotex specific. Once the market definition is broadened to encompass all computer-communications services available to the general public, the idea becomes less operational/feasible, whatever its theoretical merits might be. Even theoretically, moreover, the idea's merit is not clear. A single large corporation dominating the market would stifle the emergence of competition for a long time which, in the long run, could inhibit market development, even if it did assist it positively in the short run. More importantly, one corporation or twenty will still face the problem the market, particularly videotex services, has had for some time, a problem well summarized by Richard Hooper, commenting on Prestel in the U.K.:

> The technology of viewdata remains obstinately ahead of good examples of its cost-effective application. Even after three years of trials in the UK with Prestel, the Post Office viewdata service, there is still a general feeling that viewdata is a technological solution looking for a problem to solve. Prestel itself is a classic example of technology-push rather than market-pull.[13]

The problem for achieving a mass market lies in finding a valid product.[14] That one big firm can do this better than twenty smaller firms is not obvious; indeed, the reverse may be far more likely because the incentives and proportional effort may be greater for the case of twenty versus the case of one. As Schumacher has argued, big is not always better.[15] The on-line data base market has been characterized by a large number of relatively small firms and some big firms too, of course. But, on the whole, one of the distinctive features of the market is the relative ease of entry for small producers. Anyone with a good idea which can be transformed into a good application is capable of entering the market. This instrument can be, and has been, powerful for product innovation in this segment of the market.

Market Integration

Closely tied to the issue of competition in terms of the number of producers is the question of market integration. In other words, should participants (producers) in one segment of the production process also be permitted to participate in other segments? Should system operators also be information providers or carriers? Should carriers be system operators or information providers?

Telephony carriers in Canada have traditionally been subjected to a content/carriage separation principle, together with the attendant principles of universal access and just and non-discriminatory prices.[16] Parkhill has argued strongly that this principle and its two attendant principles should also apply to computer-communications services.[17] Many system operators, or potential system operators, feel the same way with regard to telephone carrier participation in the market. They are wary, and justifiably so, of being dependent on one of their competitors for their means of delivery.[18]

Cable companies have not traditionally been subject to content/carriage separation and are not, in general, assumed to be precluded from being direct participants, as service providers, in the computer-communications industry. Indeed, the normal model for cable companies is to be directly involved or, at least, to be a partner directly participating in the venture. In a 1979 report for the Cable Television Association,[19] an assessment of the market potential for cable companies in videotex services makes this point quite explicit.

Whether or not the traditional exemption of cable services from the separation principle, on the grounds that cable-TV is a broadcast/programming activity versus a purely distribution (carriage) activity, is accepted, this argument does not hold for computer-communications services. Further, there is no reason why cable and telephone carriers should be treated differently if they are direct competitors, as is likely in the computer-communications field. "Consistency alone demands that they be treated the same."[20]

On balance, the arguments for keeping carriers out of the content area, either as information providers or as service providers, appear to be valid. There are, however, two qualifications which must be noted.

First, carriers may be best positioned to provide users with a master index or directory of services which can be accessed through that carrier. Such a directory service could be very important in making access to services by users universal in practice. This service, in turn, could be important to market development in that it would maximize the opportunities afforded to consumers considering whether to enter the market. An index or directory provided by the carrier would, however, be a service which, while perhaps not significantly, would technically violate the strict principle of content/carriage separation.

The second and perhaps more significant qualification arises from the changing technology of telephony carrier networks which have now acquired an intelligence capability. This technology makes it relatively easy to turn the telephone network into a gateway system for providing links between users and third-party computers. Telecom Canada in 1981 announced its intention to provide such a network, "an intelligent network to provide a gateway for computerized information of all kinds."[21] iNet has since gone through a technical field trial, is now in a market trial and is very close to being a reality.

Essentially, iNet has the ability to put the full range of information and services available from any connected computer at the disposal of any iNet user. Such a system could be of major importance in promoting market development. It will provide a means of automatic access, that is, users do not need to learn a whole series of individual log-on procedures or access codes; it will provide a translation capacity to overcome, at least to some extent, problems of incompatible hardware and non-standardization of equipment; and it will provide a billing capability to information/service providers listed on the system and a single all-inclusive bill for users. In effect, iNet represents a kind of one-stop shopping option, with a number of characteristics which should be very attractive to users.[22]

While all of these characteristics relate to any gateway system, not just iNet, and since one does not need to be the telephone company to offer a gateway service, the question is whether telephony carriers should be precluded from offering gateway services such as iNet.[23] Technology has made carriage far more than providing a physical link

between two points. The relatively easy distinction between content and carriage for the case of voice telephony or circuit-switched private data transmission becomes blurred in the face of digital-switching centres, packet-switched networks, automatic number identification and other features of the present generation of technology of the telecommunications network. Ultimately, the resolution of this issue is perhaps best decided by consideration of the features of a particular carrier-operated gateway. In particular, three features will be important: control of content available on the system; the design of the billing function; and the degree of transparency in the system.

Insofar as the carrier controls access by information providers or service providers to the gateway network, even if the carrier directly provides no content to the system, the carrier will be controlling the content. Such control could be used to keep out other service providers or to enforce exclusivity agreements on information providers preventing them from also offering their data base through other service providers. Control of content, thus, could be used as an instrument for gaining unwarranted control of the market.

In terms of billing, if the carrier simply acts as the billing agent for information providers or service providers listed on the system, such bills appearing in the name of the data base vendor, there should be no problem, as long as the billing function is optional and not a condition for participation in the network.[24] If, however, the billing function operates in ways where the carrier buys the accounts receivable of the information/service providers; that is, the carrier acts as a factor, then the carrier ceases to be a billing agent and becomes the bill owner. Technical niceties aside, the party who owns the bills will be perceived by users as the party who owns the service. The carrier will be perceived as the service provider whether or not it is technically or legally the case.

Finally, if the third party computer links provided by the gateway are completely transparent, the user will be unaware through anything happening on his monitor that he is dealing with another computer. Again, the perception that the carrier is the service provider will be created and re-enforced.

Perceptions are, of course, not necessarily reality. It could be argued with respect to both the billing and transparency arguments just presented that no matter what users perceive and believe, the carrier, in reality, is not actually the service provider and cannot take advantage of the market as if it were. But, perceptions do influence people's behaviour. Users who perceive the carrier as the service provider or perceive the carrier's service as superior because it offers more choice, and so on, will buy through the carrier rather than direct. Significant distortions could be introduced into the market and either the rate or the direction of market development could be affected. The carrier will become the service provider de facto if not de jure; the practical consequences could be identical.

The proposed iNet system, at least for the market trial stage, involves control of content in terms of who can be listed on the system, but this control is intended to be a feature only of the trial. Ultimately, for a full commercial service, Telecom Canada claims no control will be exercised. If the system goes ahead as proposed, iNet will involve factoring of accounts receivable in terms of providing a billing function. The level of transparency will vary for different parts of the system.[25]

Two final points can be made regarding market integration:

1. Carriers have already introduced electronic messaging services. Both Telecom Canada and CNCP Telecommunications have systems in place.[26] Potentially this service will make the carriers direct competitors of other systems which wish to offer a messaging service. Fragmentation of the message market, whether or not the carriers belong, could be particularly serious because part of the value of a message service is a function of whom one can reach with it. If message services cannot connect with one another, i.e., if users can only reach parties who subscribe to the same service, the development of messaging services may be retarded. Neither Telecom Canada nor CNCP provide interconnection with the other's message service at the present time. While the issue is clearly not the same as basic network interconnection, it may be worth considering whether the carriers, if they are to be allowed in the messaging market as

service providers, should be required to allow interconnection of the services with one another and with other systems.

2. The preceeding discussion has focused entirely on carrier/service provider and carrier/information provider separation in the context of the content/carriage debate. It may be, however, that service provider/information provider separation is an equally important issue and that the arguments in favour of content/carriage separation apply equally to the case of content/service provider separation.[27] There is, however, a difference, in that the carrier case, by virtue of the carrier controlling the means of service delivery, could preclude or distort market participation. This difference is not true in the same way for service providers or system operators. Packaging and content will be discussed later. For now, we will simply note that, from a market development view, someone on the production side of the market must have control of both content and packaging if the product characteristics outlined in Chapter Three are to be the appropriate ones and are to be realized. The system operator is the only logical candidate for this role. There may still be an argument for forcing service providers who wish to offer content directly, i.e., to act as information providers, to do so through an arm's length subsidiary or to preclude them from doing so at all, but this argument, pragmatically, cannot be extended to control of content without, potentially, very seriously damaging market development.

Financing

Financing for computer-communications systems is the third supply-side issue we wish to discuss. It refers to a consideration of alternative sources of funds to underwrite the costs of producing computer-communications services and returning a profit to the producers.

In general, there are four sources of funds available for financing services: user charges, IP charges, advertising revenues and government. User charges involving the question of prices and price structure will be discussed below; user charges as a general alternative to other financing sources will be discussed here. IP charges, insofar as

they are distinguishable from advertising revenue, would involve things like system charges or data base storage charges. As such, they are not likely to be overly important in relative terms and will not occupy our attention. Advertising and government remain.

Many observers feel that certain forms of advertising are well suited to computer communications. Catalogues, product information, classified ads, barter boards, transactions (which, intrinsically, are a form of advertising) are all examples. On the other hand, what might be called persuasive advertising is probably not well suited to this medium. Even if colour and graphics are available, the medium will find it difficult to compete with the persuasive qualities of TV or magazine advertising. Some observers feel that advertising has its greatest potential on teletext systems.[28] Some also feel that computer-communications service advertising will be most effective when it relates to some decision-making need or to a transaction decision.[29] In these cases the user will not find the advertising objectionable because it is filling a need. Otherwise, however, as noted in Chapter Three, advertising is likely to be seen as intrusive and to be regarded as a negative characteristic of a service.

Users may, however, be willing to accept some trade-off between advertising and price if advertising has the effect of reducing the portion of total revenue requirements necessary to recover from users. In such a case, prices should be lower than those for a system without advertising and lower prices will spur development.

Advertising and transactions-related services need a strong user base to succeed. A strong user base may only develop if advertising can be used to underwrite system costs in order to keep prices down and induce entry to the market. A vicious circle could develop from this two-way causality if no way is found to break the impasse. Interestingly, transactions-oriented/advertising applications could provide a way out in two ways. First, some transactions-oriented information providers might bring with them, when they go electronic, an already established clientele, such as, for example, in the case of Sears in announcing a videotex service, Trintex, in February, 1984, as a joint undertaking in the U.S. by Sears, IBM and CBS. The service is at least two years away from introduction, however, so the hypothesis

cannot yet be tested. Second, the value of transactions-oriented/advertising applications could be large enough, if the user population is large enough, that companies might be willing to underwrite, fully or in part, the terminal costs of users in order to ensure enough users. This point has been suggested by Larratt as a possibility:

> Sellers want to make a pitch, advertize, be informative and be able to take the order . . . They also might be prepared to pick up the cost . . . of reaching their customers. Consider the retailer's other non-store selling alternatives: direct mail, telephone shopping, and reaching the customer via home computers. Telidon covers the sellers' requirements best if the population has terminals.[30]

Advertising does have a place in computer-communications systems. It is, however, a narrower, more functionally defined role than many observers realize or appreciate, for the intrusive characteristic of advertising is a problem. Insofar as advertising provides an alternative source of revenue to system operators, it can lower user charges which will promote overall market development. Where colour and graphics are important, services which offer colour and graphics, such as videotex and teletext, may have an advantage over computer-communications services which do not. This proposition, however, that colour or graphics are important for advertising in this medium, has not yet been proven.

Government as a source of revenue for computer-communications services may also be important in furthering market development. Canada's experience with government support of Telidon demonstrates, though, that the mere infusion of government funds, by itself, is not sufficient to guarantee market development. Since 1978, the government has spent at least $67 million on Telidon service developments;[31] yet, the market has still not materialized.

There are several reasons why government financing/subsidization of computer-communications services might be justified:

1. The advantages to the Canadian economy of developing high technology industries is a kind of industrial benefits argument and must be treated with caution. To be used, it must be proven, not merely asserted.

2. The advantages of computer-communications services for delivery of social services/goods may mean either increased levels of service delivery to the aged or handicapped, for example, or cost savings in the delivery of existing levels of service.
3. The advantages of computer-communications services for the fulfillment of government's statutory obligations regarding the public release of information is a cost saving argument. For the case of statutory obligations, economies depend on the market size being large enough to satisfy the definition of public availability.

Some other types of government information could also save money or improve performance if put up on a computer-communications service. Tender calls for government contracts, weather information, tourist information, education services, health and nutrition information, government directories, statistical information and so on fall into this category.

The important point regarding any or all of these justifications for government subsidization of computer-communications services is that the benefits must be real and the levels of subsidies must be consistent with the levels of benefits. Otherwise, government financing will have only a distorting effect on market development and may help create a mass market which cannot be justified in market terms.

Pricing

The fourth issue for consideration is pricing, already discussed at some length in Chapter Three. Only the two major conclusions will be reiterated: flat rate subscription fees with unlimited usage are perceived as the preferred pricing scheme desired by users and tolerable price levels for computer-communications services will depend on the value of the service(s) to users (subject to budget constraints).

From a producer point of view, prices are one of the primary revenue sources for recovering production costs and earning a profit, depending on how large other sources of financing (advertising, government) are. Prices and price structure also influence demand, however, as noted in Chapter Three. Thus, profit-motivated producers

are constrained as to the maximum level of prices by the demand side of the market, and they are constrained as to the minimum level of prices by the cost side of the market. As far as the value of the services provided to users can be raised, the former constraint will be relaxed. As far as alternative sources of revenues (other than users) can be found, the latter constraint will be relaxed.

A non-usage-sensitive pricing scheme will promote usage of the system and, all other things being equal, increase the number of subscribers. It may enhance the attractiveness of the medium for advertisers. There may, however be additional costs associated with such a pricing scheme, since unlimited usage could require the service provider to provision a greater communications capability (number of ports, etc.) and/or to add to the size of the system's computer capacity. With a telephony-based system, unlimited usage could create real congestion problems, either in the service provider's system or in the telephone switched network. Costs could rise, perhaps disproportionately to revenues, and/or reliability could suffer. Another effect of flat rate subscription fees with no usage charges could be to create a kind of user loyalty to the service provider, to lock in users who, for budget or value of service reasons, might not be willing to subscribe to more than one service. This effect might not be beneficial to the market as a whole.

Usage-sensitive pricing schemes are economically more efficient than non-usage sensitive schemes. They will, however, likely discourage usage. They are less likely to put pressure on the capacity of the system which could reduce costs or improve performance. Content which may be sponsored by an advertiser or transactions services will be difficult to charge for on a usage-sensitive basis except, perhaps, as connect time charges. Users are likely to resent receiving unsolicited advertising with something they are paying for directly. For many transactions services, they may be unwilling to use the service if they must pay because they are not used to explicit charges for such services as, for example, banking. Connect time charges, being non-specific, may escape these problems. User resentment against paying for information in general may be a larger problem.[32]

From a producer's point of view, in the absence of more concrete market information than is presently available, neither a pure usage-sensitive pricing scheme nor a pure flat rate subscription fee appears to be superior.[33] Hybrid pricing structures which adopt a tiered content concept would allow both types of pricing to be used and would also permit system operators to take advantage of relatively high usage, inelastic demand characteristics of certain services by placing these in usage-sensitive priced tiers.

Packaging, Content and Marketing

Looking more fully at the issues of packaging, content and marketing, several considerations emerge:

1. Some form of tiered content scheme will permit greater customization of service offerings and allow service providers to take better advantage of different preference functions of users.
2. Tailored services, assuming market segments have been appropriately identified and can be reached, will provide greater structure to service offerings (facilitating users' choice) and will most likely maximize participation. (Customization represents an attempt to maximize the user's perceived value of the service).
3. A business/professional market orientation is more apt to be successful at the present (1985) level of overall market development than a general consumer/household orientation. Business/professional applications are likely to have a higher perceived value at the present time, owing, in part, to the relatively greater number of service offerings already available. Business users, in general, are regarded as being more price elastic and more income elastic in their demand. They are also regarded as being more usage sensitive.[34] The greater price elasticity has to be set against the greater expected value of the applications. The greater income elasticity strongly promotes this orientation for there is a greater ability to afford the services and to expand use over time. The greater usage sensitivity suggests that some form of usage sensitive price, such as connect time charges, may be most appropriate.

4. As noted earlier, the product must be valid; that is, it must respond to the needs of users. The services most likely to succeed are those which produce tangible value. Transactions services and messaging services appear to be the most promising areas in this regard.
5. From a marketing point of view, tiered systems provide a means of maximizing the number of different budget constraints that can be accommodated while increasing producer's revenues.
6. From a marketing point of view, appropriate identification of audience groups (market segments), the right content and the right prices will probably do more to sell the services than any other marketing technique.
7. For the short term at least, the user friendly characteristics of the system will be important, especially for the household market. As exposure gained in the business market spills over to the home and as more computer-literate people emerge from the educational system, user-friendly characteristics which reduce the capability of the system will become less desirable. For now, however, simplicity, ease of use, and high level presentation protocols[35] will all be important.

Carrier Options

The carrier issue is the last supply-side issue to examine. A number of carrier-related concerns/positions need to be staked-out/resolved. Of these, the ones of greatest interest in the present context are the influence of the carrier or distribution mode on system capabilities and the influence of communications costs on market development.

Several different carrier options exist for the delivery of computer-communications services: telephone, cable, over-the-air TV broadcast (use of vertical blanking interval), FM radio broadcast, and satellite. In general, telephone and cable are regarded as the two major options at the present time. As the technology for FM radio develops, its very low cost could become an increasingly important alternative for teletext or consumptive systems more generally. It could be an important delivery alternative for opening up particularly remote markets, those areas not often served by cable or packet-switched data

networks, given the relatively high long distance charges which inhibit use in such areas. But, for major population areas, where these constraints do not apply, and for interactive services, which require a two-way capability, the FM radio system would not be as competitive. Such FM radio systems are at a relatively early level of development, although, a trial system is now operating in Ontario.[36]

Satellite systems also have not yet been fully developed as a sole carrier for data communications on other than a private or closed system basis. The basic problem is that a direct service to users via satellite requires that the user have an earth station. While earth station costs, for receiving stations at least, have been falling and the size of stations has become smaller, this service would still represent an additional hardware expense over cable or telephone systems. The earth station itself, even in a roof-top version, could be intrusive. With only a receiving station, only one-way consumptive services could be provided. To provide interactive services would require an uplink (transmission) capability as well as a downlink (reception) capability for the earth station, a feature which would significantly increase the cost.

These factors suggest that satellites as an exclusive distribution system for mass market computer-communications services are not likely in the foreseeable future. However, satellites could have an increasingly promising place in supplanting long distance terrestial networks or in providing a competitive alternative to common carrier companies if used in conjunction with cable or telephony systems to provide local distribution. This option may be of particular importance for creating a cable-based, national, mass market computer-communications network in competition with the national telephony networks.[37] As direct broadcast satellite services and the number of satellites grow in North America, the use of satellites for one-way consumptive services, distributed locally by cable, must be regarded as highly probable. For remote areas, where cable services are not available and where the demand for television signals may already make the purchase of an earth station a possibility for consumers, satellite distribution of consumptive services may also be feasible.

For telephony and cable distribution systems, the following points can be noted:

1. Telephony systems have a capacity problem at present in terms of the public switched network, which could be a real hindrance, if mass market computer-communications services suddenly take off, until such time as the existing plant has been replaced by digital switching centres and, perhaps, fibre optic cable.[38]
2. Cable has the problem that present cable systems in Canada are all one-way systems, and the technology available for making them two-way is inferior to telephony in terms of response times as well as expense.
3. Cable also has the problem that by traditionally not wiring office buildings, it is poorly positioned to capitalize on focused business applications as a way of getting the market started.
4. Telephony has the problem that most residences and small business would be unable or unwilling to afford a separate data access line, making them dependent on the local voice-message network, which means lower transmission speeds (which has implications for response times) and disrupts the availability of the phone for normal purposes. New technology, which allows a separate data circuit to be overlayed on the voice circuit using existing copper wire pairs, could solve these problems.[39]
5. The potential of the high user value services of transactions services and messaging services as the initial content focus for mass market services and the fact that business applications are likely to require either interactivity or greater depth to consumptive services than vertical blanking interval broadcast or even full channel cable capacity may be able to provide, give telephony a major marketing advantage over cable at present.
6. Cable's greatest potential may lie in services compatible with its existing television orientation.[40] This would mean services such as captioning, supplements to TV advertising, on-demand TV, and monitoring which can be carried out with the existing cable without affecting television usage.
7. Cable's potential as an advertising medium, while stressed by some,[41] may be constrained by its inability to link advertising directly with transactions,[42] as long as it is a one-way system.

8. Cable is definitely a competitor for downloading systems which have a primary software orientation (versus a primary information orientation) aimed at the personal computer market, though its inability to provide interactive on-line services versus local interactivity is still a constraint in this regard.[43]
9. The cost of using telephony systems may be an impediment to market development for long distance connections which do not go through a packet-switched network and for local connections if local measured service; that is, usage-sensitive local calling rates, become prevalent.[44]
10. Where present telephone rate structures do not impose usage-fees for local connections, a market bias is created which favours the development of computer-communications services. This may favour local system operators versus national system operators, local versus national information providers, and all other things being equal; urban versus rural inhabitants/businesses. None of these biases may be objectionable from a marketing point of view, a producer's perspective, but they may be objectionable on social policy grounds. This issue will be addressed more fully in Chapter Six.
11. Where present telephone rate structures do not impose usage-sensitive prices for local calling, a market bias is created in favour of telephony carriers over alternative carrier options and in favour of systems with an interactive capability versus consumptive systems.
12. Where communications costs are made an explicit charge to users, market demand can be inhibited, both in terms of usage and number of users. It may be useful for producers to consider the inclusion of communication costs as part of the price of the service, not to separate out communications costs as an explicit charge.[45] The disadvantages of such an approach are first, the rise in price of the service would have a negative impact on the market and second, if abnormal calling patterns arise, either in terms of the location of users or length of connection, the system operator could lose by this approach.

Conclusion

The discussion of this chapter has highlighted a number of considerations relating to the supply-side of the computer-communications services market which could influence market development.

The one issue not discussed, because it is taken as axiomatic, is that for there to be any supply at all, the services must be profitable, if not individually then at least per system provider, and if not in the short-run, then at least in the long-run. This last point is important to emphasize because, given that the mass market is starting virtually from zero[46] and that profitability for producers will depend to a large extent on building a large market, the pay-back period on investments is undoubtedly longer than what is normal for mature industries. Barring any "surprises," to use Larratt's word, producers will likely have to accept several years of losses waiting for the market to develop in order to be positioned in the market to earn profits in the long run.[47]

We turn now to the examination of possible market development scenarios over the next three to five years as a way of bringing together the demand analysis of Chapter Three and the supply analysis of this chapter.

Notes

1. The NABU Network, for example, requires the use of NABU's own personal computer. Viewtron in the U.S. requires the use of AT&T's Spectre videotex terminal. Infomart's Grassroots system also has a dedicated decoder/terminal device.

2. Personal interview, Infomart.

3. The idea of consumers piecing together their own information system over time is noted by M. Irwin, "Technology and Telecommunication: A Policy Perspective for the 80's," Working Paper No. 22 (Ottawa: Economic Council of Canada, 1981), p. 83.

4. J. Helliwell, "Micro Innovation Shifts to Software," The Globe and Mail, March 2, 1984, p. B17.

5. R. Lerch, "Now Videotex Software can Replace Decoder," The Financial Post, October 8, 1983, p. 19.

6. J. Chevreau, "Radio Teletext Eliminates Telephone Costs," The Globe and Mail, September 23, 1983, p. B19.

7. Personal interview, Infomart and others.

8. D. Climie, "Pioneers Change Path on Videotex Highway," The Financial Post, January 28, 1984, p. 30.

9. Ibid.

10. Each of these possible sources of reduction in unit costs is discussed in Appendix A.

11. Hickling-Johnston, op. cit., p. 36.

12. Larratt, op. cit., p. 79.

13. R. Hooper, and Mills & Allen Communications Ltd., U.K., "Applications of Viewdata," in 3rd International Online Informational Meeting, London 4-6 December 1979 (Oxford: Learned Information, 1979), p. 283.

14. Personal interview, D. Carlyle.

15. E.F. Schumacher, Small Is Beautiful (London: Blond and Briggs, 1973). Schumacher's actual phrase is the "idolatry of giantism." (p. 56)

16. For a discussion of the content/carriage principle in the context of videotex see B. Lesser, Alternative Market Structures for Videotex Service in Canada: The Public Policy Implications (Halifax: Centre for Development Projects, Dalhousie University, 1982), pp. 57-66.

17. Parkhill, op. cit., p. 93.

18. This point was made in several personal interviews.

19. Tamec Inc., op. cit.

20. Lesser, op. cit., p. 62.

21. Press Release, Computer Communications Group, TransCanada Telephone System (now Telecom Canada), May 20, 1981.

22. Personal interview, Bell Canada.

23. CNCP Telecommunications also has plans to introduce a gateway network for computer-communications services.

24. If it is a condition of participation, this could influence/bias the participants. Many service providers are reluctant to have anyone else know their customers and customers' characteristics. Thus, they might wish to opt out of having anyone else do their billing. The carrier would have the information anyway, of course, but not necessarily in the same detail, and, also, the same need to keep the information beyond some relatively short period of time would not be there..

25. Personal interview, Bell Canada.

26. For a brief discussion of electronic mail or message systems now in place, see B. Gates, "Electronic Mail: Idea Whose Time has Nearly Come," The Financial Post, Special Report, February 4, 1984, p. s7.

27. Lesser, op. cit., p. 62.

28. This argument is advanced, for example, by Tamec Inc., op. cit.

29. Personal interview, Time, Inc.

30. Larratt, op. cit., p. 68.

31. J. Chevreau, "Videotex Service Set for Next Year," The Globe and Mail, March 9, 1984, p. B17.

32. Many kinds of information such as news, weather, etc. are presently available free in the sense that there is no marginal cost to consuming such information. If computer-communications systems try to charge for such information, they may face strong consumer resistance. This general problem is discussed by G. Thompson, "Memo from Mercury: Information Technology is Different." Occasional Paper No. 10 (Montreal: The Institute for Research on Public Policy, 1979).

33. Some of this information may be known from various field trial experience and other market research but, in general, it is considered proprietory and is not available to the public.

34. Personal interview, Infomart.

35. The importance of presentation protocols is stressed by Larratt, op. cit., p. 77.

36. See footnote 6, this chapter.

37. Personal interview, NABU.

38. Personal interview, Bell Canada.

39. Personal interviews, GTE Telenet and AT&T. A lack of engineering/technical knowledge on the part of the interviewer may mean that the description of this technology is not accurate but the effect of the technology is as noted.

40. Personal interview, Rogers Cablesystems.

41. See, for example, Tamec Inc., op. cit.

42. Personal interview, Time Inc.

43. This type of system is exemplified by the NABU Network.

44. LMS is regarded as quite likely if the long distance market is opened up to competition.

45. This is the case at present for many services which use connect time charges, where the connect time charge is inclusive of the communications cost involving the use of specified long distance data networks.

46. It is not zero in that some services do exist, such as Teleguide and Grassroots, which meet our definition of belonging to the mass market and because some specialized, closed-user group applications which already exist could be opened up to the general public, although their price/price structure may not support such a move.

47. Certainly, this has been the case of companies such as Infomart and others in Canada. Infomart's Grassroots system, for example, is not expected to be profitable until the end of 1985 while their Teleguide system in Toronto is not expected to be profitable until 1986. (Chevreau, op. cit., p. B17.)

5: SCENARIOS OF MARKET DEVELOPMENT

Chapters Three and Four have identified and analyzed a number of factors on the demand and supply sides of the market likely to influence market development for mass market computer-communications services in Canada. In this chapter an analysis of the two sides of the market are combined in an effort to predict, qualitatively, how this mass market may be expected to develop over the medium-term, the next three to five years. To do so, a number of different scenarios of how the market might develop under different assumptions will be examined.

Some Existing Scenarios

Thompson[1] sets out a market development scenario which he labels "the information market-place . . . strategy."[2] He begins with the proposition "Innovative applications of information-technology that have significant higher order impacts and are wealth creating, transformative and socially beneficial seem to be constrained from occurring."[3] The constraints Thompson feels are holding back development in the direction he seeks are "our centuries-old experience with the trade of hard goods, our dedication to industrial technology, and our poor understanding of wealth creation."[4] The information market-place is a "pluralistic" strategy intended to overcome these constraints.

The basic idea of Thompson's information market-place is that anyone and everyone would offer information for sale, using intelligent terminals and intelligent networks to coordinate/operate the market. Individuals providing information would be rewarded in proportion to the usage rate for their information. Consumers would pay a flat rate subscription fee and have unlimited access to a rather popular material, general audience sector of the system. A second sector of the system would contain more specialized offerings or less popular offerings and would operate on a usage-sensitive pricing scheme, probably a cost-per-page scheme. Contributors would decide for themselves in which sector to place themselves. Storage charges would be charged to contributors, with the low-price, high-use sector probably paying more than the high-price, low-use sector in order to maintain a proper balance between the two. In time, the high-price, low-use sector is expected (by Thompson) to generate "the interesting and economically significant material."[5] Because of the complexity of the system, brokerage type services ("information about information") can be expected, creating a further level of activity and opening up new entrepreneurial opportunities. The coordinating body for this market would be the "General Information Corp.,"[6] which, by implication, appears to be the telecommunications carrier(s). General Information Corp. would deal directly with its customers, users, "through the computer-based record-keeping facility of the information market-place."[7] Emphasizing the individuality of the value of information, Thompson argues, "A given information package will appeal to only a few individuals, and many, many such packages must be prepared to give a collection of information any utility to a user population."[8] The system will be driven by small, independent entrepreneurs. This pluralism according to Thompson, is "an important key to overcoming the little-understood constraints that appear to be inhibiting the application of this new technology in both socially and economically beneficial ways of major significance."[9]

Thompson's scenario, regardless of its merits, is one that would have no chance to come about (in the next five years) or even to get started. Thus, on purely pragmatic grounds it is not an option of major concern here except to the extent that, if it were accepted as a longer-run objective, there would be a need to ensure that the medium term

development of the market was consistent with this longer-term goal. The argument has a variety of other problems, however, which suggest, at least in the specific form proposed by Thompson, such an approach is not likely to work. Perhaps one of the most serious problems, setting aside a variety of questions concerning government's role, regulation, content/carriage separation, carrier competition, the information absorption capacity of individuals and others, is that Thompson seems literally to be talking about information. That is, in the context of our functional classification, he appears only to be discussing "information-retrieval" services.

The primary value of Thompson's scenario for purposes of this study lies in certain characteristics of the information market-place which he identifies as important:

- open access for information-providers
- the individuality of the value of information
- the use of intelligent terminals
- the use of intelligent networks
- tiers of content
- a combination of flat rate subscription fees and usage-sensitive prices, according to different tiers of content
- innovative applications
- centralized billing[10]

These characteristics have been referred to in the preceeding analysis, and many are deemed important and/or desirable.

Larratt considers three general development scenarios for achieving the "public/consumer information utility":[11]

1. Way A involves a "home system [which] is a complete micro-computer system . . . Such a system would be programmable and very flexible."[12]
2. Way B involves "a function centered pre-programmed "black box" . . . easy to use and operate because it would be dedicated to one task . . . The supplier controls this system, rather than the user."[13]
3. Way C combines Way A and Way B; it is "a standard player piano when you want it to be . . . and yet still retains its non-automatic mode when desired."[14]

Larratt considers Way A a system for computer literates; the user microprocessor for the system is a programmable computer. Way B is for computer illiterates; the microprocessor is an appliance. Way C is for the computer semi-literates; the microprocessor is a programmable computer with software packages as appliances.[15]

The relevant characteristics of the market place which emerge from Larratt's scenarios are:

- the importance of the terminal device to the character of the system
- the relationship between the terminal device and the range of service offerings
- the distinction between an information orientation and a software orientation
- the potential impact of computer literacy on the character of the system
- the importance of functional applications—transactions, messaging, monitoring and information retrieval—but not necessarily computing
- for Way B, the importance of user-friendly systems.

Roger Hough[16] does not offer a scenario but does raise a number of questions, in particular whether Telidon systems can perform various functions (information retrieval, calculations, transactions, person-to-person communications, quizzes and games, education, opinion polling, telesoftware) as well as alternative technologies and whether "the market is necessarily ready for interactive information capabilities of the type that Telidon provides."[17]

From these questions Hough derives three relevant conclusions for building scenarios of what is to come:

1. For Telidon to succeed against competing, non-Telidon, computer-communications services requires a reduction of costs, provision for the use of already-prepared data bases, provision for alphanumeric as well as numeric-only input and aggressive marketing;
2. Teletext development, based on the development of an inexpensive decoder to allow the market to capitalize on the base of existing television sets in North America, suggests a short to

medium term strategy to achieve market penetration; in the longer run teletext may be favoured by home users over two-way videotex;

3. Government support for Telidon will be required to ensure that Telidon systems reach market maturity.

While these conclusions are framed in terms of Telidon, making the discussion even more narrow than videotex, the implications for the computer-communications mass market, in general, are:

1. consumptive systems may be a preferred marketing strategy for home market penetration;
2. government support is necessary for at least some parts of the mass market to succeed;
3. cost is an important characteristic of computer-communications services;
4. choice and diversity will be important;
5. data base creation cost is an important characteristic of the producer side of the market;
6. systems which have more limited capability relative to alternatives will have less chance of succeeding in the market, all other things being equal;
7. the technology will not sell itself.

The Wescom evaluation of the Telidon field trials in Canada[18] contains a great deal of useful discussion. One interesting part for our present purpose is an identification of "critical developments for market take-off":

- the need to develop interactive services
- the need to enhance capabilities and possibilities for electronic banking
- the need to develop more effective public services
- the need to reduce the price of hardware for IP's and end users below $1000 and preferably to a level between $300 and $600
- the need to provide incentives for the investigation of new applications focusing on content.[19]

While these points are also made specifically with regard to Telidon, they can easily be translated to computer-communications services in general. A particularly striking feature of this list is that,

with one exception, all the items relate in some way to content. The message is the same as one derived from Hough—the technology will not sell itself; it must be needed.

Other strategic considerations which have been noted by industry observers, some of which have already been referenced in Chapters Three and Four are an initial business applications focus, a narrowcasting or targeted audience approach, an integrated market approach, and a carrier-based approach.

While much of this discussion accords with the analyses in Chapters Three and Four, virtually all of the views presented, from Thompson through Wescom, are incomplete in that they do not project a total view of the market and market development. They do, however, provide many of the pieces with which an attempt to construct a total view can be made.

A List of Options

Drawing on the preceeding discussion of this chapter, Table 5.1 presents a list of possible market development strategies for mass market services. The listings in Table 5.1 are distinguished in terms of the primary focus of the strategy. The listings are not necessarily mutually exclusive alternatives; indeed, some of them necessarily would have to proceed in combination.

Table 5.1

Possible Market Development Strategies

- Pluralistic based
- Telidon based
- Videotex based
- Teletext based
- Personal computer based
- Carrier based
- Information based
- Government support based
- Content based
- Focused applications based
- Residential based
- Business based
- Price based
- Hardware based
- Advertising based
- Software based

Table 5.2 examines possible combinations of strategies which represent potential complementary combinations of strategies shown in Table 5.1. The numbers across the top of Table 5.2 correspond to the numbers assigned to each strategy in column 1 of the table. Table 5.2 identifies potential complementarity between strategies, not compatibility. In other words, certain strategies may be able to co-exist but might not be complementary in the sense that the combination enhances the characteristics of either taken separately. Table 5.2 also identifies only two-way complementarities; that is, potential complementary combinations of more than two strategies are not indicated by the table. In addition, Table 5.2 does not indicate where complementary strategies involving a common element may be incompatible with one another. For example, a Telidon strategy may be complementary to either a videotex strategy or a teletext strategy. But, insofar as videotex and teletext as development strategies represent alternatives, the Telidon/videotex and Telidon/teletext combinations would also be alternatives. Further, Table 5.2 has eliminated complementary combinations where the combination would force one of the two strategies to be of a form which would be overly restrictive. For example, while a carrier-based strategy and a personal-computer based strategy could be combined, the personal-computer strategy could be severely restricted in its characteristics by the imposition of a pre-determined carrier choice. Finally, it is stressed that in cases where a strategy may involve some further level of choice, for example the addition of a hardware strategy, the designation of a complementarity with some other strategy may imply a prior selection among these choices. In the hardware case, the complementarity with carrier strategy may restrict the hardware being emphasized. Teletext terminals as a hardware focus do not go with telephony as a carrier focus.

A number of things stand out from Table 5.2. First, a content-based strategy could be combined with any of the technology based strategies (videotex, teletext, etc.), although it must be recognized that the range, depth, and structure of the content could differ significantly depending on the technology. Second, the focused applications, software and information strategies, which could be considered

Table 5.2

Potential Complementarities Between Development Strategies

Strategy	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Pluralist																
2. Telidon																
3. Videotex		x														
4. Teletext		x														
5. Personal Computer	x	x	x	x												
6. Carrier																
7. Government Support	x	x	x	x	x	x										
8. Content	x	x	x	x	x	x	x									
9. Focused Applications	x	x	x		x	x	x	x								
10. Residential		x	x	x	x		x	x	x							
11. Business					x		x	x	x							
12. Price	x	x	x	x	x	x	x	x	x	x	x					
13. Hardware		x	x	x	x	x	x			x		x				
14. Software		x	x	x	x		x	x		x		x	x			
15. Information		x	x	x	x		x	x		x		x	x			
16. Advertising		x	x	x		x	x	x		x		x			x	

together with content itself to fall within the class of content-related strategies, could also be combined with any of the technology options. Third, a carrier based strategy is not considered complementary to any of the specific technologies on the grounds that substantial differences between the capabilities allowed by a particular mode of carriage would overly constrain the functionality of a technology while no differences would make a carrier-strategy redundant if imposed on a technology-based strategy. Fourth, Telidon, videotex and teletext strategies are not considered complementary to a business based strategy on the grounds that the former would imply an exclusivity of focus which would be inappropriate to the varied and, at times, sophisticated needs of a business audience. Thinking of Telidon, videotex or teletext services existing in the business market poses no problem. But, this notion is not the same when they are the basis of a development strategy. Fifth, a price based strategy is potentially complementary to any other strategy, if price strategy is considered to be one of pricing services (and other system costs) so as to gain widespread use while offering producers a reasonable return on their investment. A pricing strategy, thus defined, does not necessarily mean making prices as low as possible overall. It could involve differential pricing by type of content or type of user (e.g. business versus household) or number of services and so on. Sixth, the complementarity of a hardware strategy with a Telidon, videotex, teletext, personal computer, or carrier strategy, in each case has necessary implications for the hardware strategy. It can only be consistent with one of these insofar as they are alternatives when considered as strategies. Seventh, a personal-computer strategy can be made complementary with any other strategy. Again, the nature of the resulting network(s) will be considerably different depending on which combinations are being considered. Also, compatibility with any other strategy does not make a personal computer strategy simultaneously compatible with all the other strategies. Nevertheless, Table 5.2 does emphasize the flexibility in system options which would result from a strategy of building the network(s) around the personal computer as the primary terminal device.[20] Eighth, although advertising is shown as compatible with a number of other strategies, a pure advertising focus would have major

implications for content and applications. In the context of Table 5.2, advertising is primarily complementary to technology based strategies and economic based strategies and not to content based strategies. Finally, a strategy of government support is shown by Table 5.2 to be complementary to any other strategy. This result could be interpreted in various ways. One interpretation suggests that government support in itself will not lead to the development of a mass market; the program of support must have some additional focus. The market still may not succeed with such an additional focus, but it certainly will not succeed without it.

From Table 5.2 and the conclusions that have been drawn from it, the strengths and weaknesses of certain strategies are clarified. In particular, a pricing strategy, a personal computer strategy and a content strategy stand out as elements interdependent with each other and with all other strategies identified in Table 5.2.

Some Further Conclusions

From the analyses of Chapters Three and Four, additional conclusions can be drawn with respect to the various strategies shown in Table 5.2:

1. The case for building the mass market around any particular production technology to the exclusion of others is not a particularly strong one. The service characteristics desired by various users, the cost implications of different production technologies relative to the enhancement of value for users and the functional capabilities of different production technologies suggest that an exclusive focus on any one technology will fail to take full advantage of the multi-dimensional, individualized character of the market, both on the demand and the supply side of the market and/or will fail to take full advantage of the economics of the market, the fact that different users have different means. From a technology point of view, the more universal the market in the aggregate, the better it will serve users and the larger it will be.[21]
2. The case for building the terminal market around the personal computer is strong because of the support it would lend to universality both in technical terms and in functional terms.

Once again universality must be defined in aggregate terms rather than at the level of individual services or systems. Also, it is important to remember that the personal computer may require an additional expenditure to acquire certain capabilities; for example, the purchase of a videotex software package to make use of a videotex service. Very importantly, for both the residential and the business segments of the market, the personal computer will offer the advantage of an installed, existing terminal base, given the sales penetration already achieved by personal computers, and one which is expected to continue to grow quite substantially over the next several years. Coupled with the greater capability of the personal computer, the advantages of this strategy (Larratt's "Way C") appear considerable.

3. The case for emphasizing content issues is extremely strong. It includes not only what services are offered but how they are packaged and to whom they are directed. For the residential market, transactions have consistently been identified by most trials and field surveys as a major characteristic or capability desired by consumers. Messaging services have also ranked high in terms of functional categories. Information retrieval, by itself, is not highly ranked. This ranking is not surprising when one considers the non-essential character of the vast majority of information coupled with the present availability of relatively reliable, inexpensive alternatives to serving pure information needs. The relatively high cost of initial entry to the market means that high-value services must be offered or available before consumers will enter the market. Transactions and messaging services as well as monitoring services are the most likely candidates for delivering high value. Content packaging will also be important in two respects: first, focused applications will increase the perceived (and actual) value of the service to users and may allow higher initial prices as a way of at least partially offsetting the higher per unit costs which can be expected until market size grows; and second, within systems, tiering of content offers the advantages, for users, of being able

to restrict initial expenditures to wanted items while still having some choice, to make their range of choices much simpler and more manageable at the beginning when the system may seem intimidating to all but the computer literate, and to allow them to get to the services and functions they want more easily and more quickly. For producers, tiered content opens up opportunities for differential pricing and value-added pricing while still staying within a subscription-based service, for combining subscription fees with usage-sensitive prices and/or with advertising, and for limiting or controlling usage patterns so as to minimize the costs associated with communication and computer capacity necessary to meet peak-demand.[22] Business applications as an initial market strategy have considerable appeal given the existing penetration of microprocessor technology in offices, the market experience already at hand for dealing with the business market resulting from the on-line data base market which already exists, and the higher, and more easily recognized, value of many business applications which make the business market more willing (and able) to support higher prices, an advantage to the higher unit producer costs of serivces that can be expected initially.

4. Prices and price structures will be important and, again, flexibility in the aggregate is what is called for, at least until such time as a clear indication of consumer preferences becomes obvious. Present available evidence suggests that residential consumers favour flat rate subscription fees, but this conclusion is still based on relatively limited evidence and, more important perhaps, on relatively limited systems. In other words, the availability of many services and many systems has still not been experienced; when and if it is, attitudes towards paying many subscription fees versus paying-as-you-go for each system or service may change. Business consumers are perceived to have a preference for usage-sensitive prices and, for this side of the market alone, having both pricing options available in the aggregate will be important. The level of prices is a greater concern for residential users than for business users, subject to

the general qualification that, all other things being equal, tolerable price levels will depend on the perceived (actual) value of services. Certainly, from the perspective of overall market development lower prices are preferable to higher prices and the lower the better. In this regard, the use of advertising could help considerably to keep prices low. The potential of the medium for advertising purposes relative to other mediums should not, however, be overemphasized. Advertising applications have a place in the market, particularly when tied into a transactions capability or some other specific purpose. However, as a general purpose advertising medium, computer communications is inferior in technological terms. Advertising could be regarded by users as intrusive and, hence, unacceptable, and advertising would greatly restrict or limit the functionality of the market if focused exclusively on content. Ultimately, from the point of view of helping to keep prices low while providing producers with adequate revenues, transactions services paid for by the transactions vendor, a quasi-advertising or directed advertising, is likely to be more important.

5. With regard to carriers, the case for building the distribution network around any particular mode is highly questionable since communication costs could be an important factor in market development. Carrier competition costs are minimized and competition will be greater when there are competing modes rather than only competing firms for the same mode. Moreover, certain production technologies are best suited to certain carrier systems or cannot be accommodated by all carrier systems. If all production technologies have a place in the aggregate market, then all carrier modes must also have a place in the aggregate market in order to meet the needs of producers. Teletext is a broadcast or cable technology. Interactive systems are a telephony technology (given the present development of the cable industry). Although satellites could compete with both telephony and cable, the present technology and economics of satellites do not support satellite distribution as the exclusive carriage mode.

A General Scenario

Out of this analysis of market development, a number of conclusions emerge regarding the general shape most likely to maximize development of the market at large:

1. non-exclusivity of production technologies and distribution channels;
2. convergence of the terminal market around the personal computer;
3. a recognition of content (versus hardware) as the basis for the market;
4. transactions and messaging services as the primary functional applications offered;
5. gateway facilities to re-enforce the universality of the network(s) being promoted on the hardware side;
6. focused applications directed at identifiable market segments, emphasizing high-value content for those segments;
7. initially at least, a focus on business applications with general consumption/residential consumption services following on the basis of spillover from the business market, increased personal computer penetration of the residence market, and the use of transactions and messaging services by the residence market (this does not imply an exclusive focus on the business market even initially);
8. price structures and price levels which maximize the market entry possibilities for as large a number of people as possible; these will involve: tiered-content, information-provider financed content/services (advertising, transactions, etc.), a combination of subscription fees and usage-sensitive fees on multi-tier/multi-service systems and, possibly, differential pricing to different classes of users,[33]
9. financing arrangements which draw on information-provider revenues (including storage charges, sponsored information, advertising, and sponsored transactions services) and user charges to support the service; government support, except for government sponsored information which may be a short-run source of financing (discussed in Chapter Six) but cannot be counted on and should not be counted on in the longer-run.

How large will this market be within five years? This question cannot be answered. The analysis offered has produced conclusions regarding the shape of the market most likely to promote market development, but how quickly the market develops will depend on how quickly this shape emerges. If and when it emerges, the market could move very fast. Until then, development will be much slower. One of the factors which will matter most will be the provision of high-value content; this factor must be regarded as the most important governing the emergence of the mass market and the timing of that emergence. Personal computer sales, under the scenario drawn here, will also heavily influence the development of the mass market for computer-communications services. While there are many forecasts of what personal computer sales will be in the next several years, few of these can be treated with any great reliability; price trends, new models, manufacturing company failures, all combine to make predictions in this market highly uncertain. As a representative of Apple Computer recently noted, "Five years is a lifetme in the computer field."[24] One forecast, made at the end of 1983, predicts a world-wide increase in production of micro-computers of almost 90 percent in 1984; for the U.S. the forecasted increase is 98 percent. 1983 production figures were in the millions.[25] Canadian sales are, of course, only a fraction of these totals, but the rate of growth in Canada should be strong. The Canadian market does suffer, it should be noted, from higher prices than these in the U.S. An IBM personal computer costs approximately 50 percent more in Canada than in the U.S.,[26] a ratio said to hold for other brands as well.[27] This price differential will likely cause Canadian sales growth to lag behind the U.S.

Conclusion

There is one notable omission in the scenario arrived at and that is any explicit mention of government in terms of government subsidization of computer-communications market development, other government policy measures which could assist market development, or a consideration of alternative policy objectives for computer-communications services and the implications these may have for market development.

Government's potential influence on the development of a mass market for computer-communications services could be crucial as to whether the desired shape of the market we have outlined is realized and how quickly it is realized. Thus, the conclusion to this study, Chapter Six, turns to a consideration of government's role in the development of mass market computer-communications services.

Notes

1. Thompson, op. cit.
2. Ibid., p. 29.
3. Ibid., p. 29.
4. Ibid., p. 29.
5. Ibid., p. 31.
6. Ibid., p. 31.
7. Ibid., p. 31.
8. Ibid., p. 32.
9. Ibid., p. 33.
10. This may be considered to be a weak interpretation of Thompson's concept of pluralism or as an implicit condition for his pluralism to be realized.
11. Larratt, op. cit., p. 61.
12. Ibid., p. 62.
13. Ibid., p. 62.

14. Ibid., p. 63.

15. Ibid., p. 79.

16. R.W. Hough, op. cit.

17. Ibid., pp. 138-139.

18. P. Booth and R. Wills, Telidon Evaluation, Executive Summary Report, Major Policy Recommendations ([Vancouver] Westcom Communications and Research Studies Ltd., 1983).

19. Ibid., pp. 44-45.

20. In a business context and perhaps in some residential contexts, a personal computer strategy means the use of a programmable computer as part of the user's hardware unit. The term should not be taken literally to mean the particular class of computers known as personal computers or micro computers, although the price and size advantages of this class of machines does make it the dominant focus for mass market services.

21. This simply means that each service or system need not be universal in its technology so long as the market as a whole provides all technologies for which there is a definable demand.

22. If on-line games, for example, threaten to create congestion, rather than provision extra capacity, games might be put in a tier to which access can be gained only during off-peak hours.

23. Differential pricing will depend on the ability of producers to segment markets and to prevent cross-overs between market segments. Given the character of computer-communications technology, it could be very difficult to prevent cross-overs. One possible way of accomplishing a form of differential pricing might be in the total packages offered to targeted audience groups; if

more general content is attached to specific content and one price charged for the whole package, implicitly the general content may be priced differently in each case.

24. Quoted in S. Ginsburg, "New Perspectives on Software Design," Interface Age, January 1984, p. 83.

25. These figures are from the company Dataquest. They are quoted in D. Chandler, "Green Grows the (Silicon) Valley," Interface Age, January, 1984, pp. 82, 84. Other forecasts differ considerably from these in absolute terms but all predict strong growth.

26. J. Chevreau, "PC Junior having tough time leaving nest, entering homes," The Globe and Mail, March 2, 1984, p. B11.

27. Chevreau, "Videotex Service set for Next Year," op. cit., p. B17.

6: GOVERNMENT POLICY AND THE ROLE OF GOVERNMENT

The social, political and economic policy objectives which the government adopts for computer-communications services will have different implications for the shape and timing of the market's development. Government has the potential to impede the development of the market by the actions it does or does not take; it has the potential to alter the shape of the market by the actions it does or does not take; and it has the potential to promote the market's development by the actions it does take.

Specific analysis of the social, political and economic objectives of government would be at odds with the central focus of this study, in that, to this point, market development per se has been emphasized. In this regard we have defined the market, classified the components of the market, examined the characteristics of the demand side of the market and the supply side of the market, examined different scenarios of market development over the next few years, and outlined the ingredients or characteristics of the market felt to be necessary to the emergence and survival of a mass market for computer-communications services. Implicitly, this analysis has assumed the desirability of a mass market dictated by economic concerns as expressed in the market place. The questions asked and the analysis offered have been primarily concerned with how to get there.

This assumption may not be shared by government. There are various objectives, whether social, political or economic, which, from a public policy perspective, might be considered for computer-communications services, but some may not be consistent with a mass market concept or with the shape of the market as outlined in Chapter Five. Others may even imply a quite different timing for the emergence of the mass market.

The issue of public policy objectives for computer-communications services will be considered in more detail at the end of this chapter. For now, the focus on market development will be continued and the role which government might play in either fostering or retarding such development examined.

Government Subsidies

One obvious policy government might consider which would affect market devlopment is direct subsidization. The Canadian government has, in fact, pursued this policy for approximately the last six years with its support for Telidon videotex/teletext technology.

In economic terms, direct subsidization programs of any kind in any area are justifiable only if net social benefits are expected to be realized; that is, net benefits which are consistent with the level of subsidies provided over and above the private returns earned by producers.[1] These social benefits will depend to a large extent on the public policy objectives government has determined for the economy or for the particular sector. In other words, the existence and the "magnitude" of social benefits present will depend, to a large extent, on subjective judgements regarding goals and the relative priority of goals.

As a general conclusion, however, it can be noted that before government embarks on a direct subsidy program or offers concessions of other kinds to an industry, there must be some determination that the subsidy program is justifiable. Assuming this is the case, there are a number of additional points to be emphasized regarding subsidy programs:

1. In general, subsidy programs to support an industry at large should be regarded as short-term programs. The longer a subsidy program continues, the harder it will be to justify the program

2. Exceptions to this general rule may arise for cases where there are on-going social benefits of a type which would be lost if the subsidy were discontinued and there are no better alternatives for achieving these social benefits.
3. Even when social benefits are present, if the private market would undertake the economic activity without government assistance, the government subsidy program will not be justified.
4. The justification of subsidies still leaves open the significant question of how to implement the subsidies.

For the case of the computer-communications market, the strongest argument in favour of government subsidies is a kind of infant-industry argument. Because of uncertainty and/or higher than normal costs at the beginning of a new venture, government assistance may be required to help an industry to become established, to reach some level of maturity if, otherwise, the initial impediments would keep the industry from developing at all. In the case of Canada, it can be argued that short-term subsidies are needed to support the computer-communications industry to the point where it can stand on its own. U.S. competition, the lack of an adequate existing labour force to produce services, the lack of established distribution channels, the inability to realize economies of scale because of the initial small size of the market and the inexperience and lack of familiarity with the medium on the part of consumers are all arguments which would support short-term government subsidization of the industry.

In the longer run, specific subsidies, such as public access terminals or special services for the disabled, etc., may be justified on the grounds that the market would be unwilling to provide such services without subsidization. This observation assumes, of course, that the benefits of such services are felt to justify a subsidy at all. Such subsidies may represent an important part of the government's role in the computer-communications mass market. They should not be confused, however, with general subsidy programs for the industry. If these programs cannot be justified on a short-term basis, the case for having them is severely weakened. In the long run, if the market cannot exist without subsidization, with the exception of specific subsidies to serve special social policy goals, the implication is that

computer-communications services are not sufficiently valued by consumers to make it worthwhile for consumers to support the market at a level which allows it to survive. If this is the case, whether government should keep the market alive is not clear. Given that it is much harder to remove subsidies which already exist than not to introduce them in the first place, the need to justify subsidy programs at the outset becomes very important.

Finally, how the government subsidizes the computer-communications industry may be very important. The experience to date with Telidon illustrates this very well. Essentially, the Telidon experience was a hardware subsidy program where emphasis was placed on the production of Telidon terminal equipment and on technical field trials. The Hickling-Johnston report, as far back as 1979, made the point that "unfortunately, in our view, much of the consideration to date has focused inappropriately on the hardware aspects of viewdata systems, and relatively little thought has been given to the serviceware aspects."[2]

In terms of the characteristics of the preferred market development scenario set out in Chapter Five, we are in accord with Hickling-Johnston's view. Since content (serviceware) has been identified as the single most important characteristic with respect to market development, a single hardware focus, such as Telidon, will limit the market potential of computer-communications services to a single technology and dedicated terminal equipment. More significantly, the focus will be emphasizing the wrong side of the market. The hardware pieces are already there; what is required is something to use them for.

The government's hardware strategy has not worked—at the end of 1983, there were only 5000 Telidon terminals in use in Canada.[3] The government itself appears to have recognized this and has reoriented its support program towards software development.[4] The government "suggests" two reasons for the failure: slow acceptance of standards and the recession.[5] Both have some validity, but primarily with regard to producers. Some producers (information providers and system operators, actual and potential) may have held back their development plans because of the lack of standards and the recession. Consumers

also may have been affected by the recession. However, most consumers probably do not understand Telidon technology well enough to understand that there has been a standards problem. The main point which consistently resurfaces is that without a viable product there can be no market.

The shift in government funding towards software development is, according to the analysis here, a shift in the right direction. But, insofar as government funding is still directed predominately towards Telidon technology, it can still be questioned. The place of Telidon in the market has not been established in relation to the alternatives except as a graphics protocol, which is not the same thing as Telidon as a videotex or teletext system. The analysis of this study suggests that technology choices should be left to the market to decide on the basis of product/service characteristics and costs. There is no reason to believe that the market will choose only one technology and no reason to believe that one technology would be a best choice for the market. The available range of options for consumers will be maximized by the use of multiple technologies, with software and/or hardware peripherals being developed to provide any necessary interface that is required between alternative technologies.

Regulation

A second important area of government action to market development is the way the industry is regulated. At the present time, by virtue of existing regulation of both telephone carriers and cable companies, the emergence and timing of development for the entire market is significantly affected by regulatory control.

Although it is beyond the scope of this report to comment on the regulatory process in detail, two general observations relating to process will be offered:

1. If the industry, or parts of the industry, are to be regulated, then it will be important for producers to know this and, more significantly, to know what the rules of the game are going to be.[6] The rules of the game will also be significant for other areas of government policy;[7]
2. The timing of market development, under a given set of rules, will

be heavily influenced by how soon the regulator makes the rules. Regulatory delay could hold back market development for a considerable period of time. Delay of when Canadian producers will be able to enter the market may be important because, in the meantime, the U.S. market is developing rapidly. U.S. services could supplant Canadian services in the Canadian market. U.S. competition is likely to be a very real market force in Canada under any circumstances. But, if the U.S. market develops first, the battle between U.S. and Canadian producers may be over before it ever starts.

What both of these comments regarding regulation reveal is not what should be decided but that decisions should be made and made as soon as possible if market development is not to be retarded. Delays have already occurred in the CRTC in hearings for enhanced service offerings by the telephone carriers and non-broadcast service offerings by cable companies. Permission for Telecom Canada to begin the market-trial phase of iNet held up the start of the market trial. It is, of course, not necessary for the government to leave these decisions to regulatory bodies like the CRTC. Government could set the policy directly. If regulatory delay continues to be a problem, then, perhaps, this option should be considered.

Other Policies

A heavy emphasis has been placed on the personal computer in the scenario of market development outlined in Chapter Five. Noted also were the much higher prices for personal computers in Canada than the U.S. One reason for this price difference is the Canadian tariff. A policy initiative which government might consider is the reduction or elimination of tariffs on micro-computers. The focus of this study is concerned with the development of the computer-communications services market. Equipment costs will influence that development. It is highly questionable whether Canadian producers of equipment will be able to compete effectively against multinational firms in this market without protection; however, even with protection, it is not clear they can compete. What is clear is that with protection prices are being held artificially high and creating a bias in consumers' choice between computer-communications services and alternative technologies.

In the long run, it is quite possible that Canada can establish a competitive position in software and in systems for computer-communications services. If so, as already agreed, attention should be focused in this area. An important corollary, however, is that a successful software/content focus is dependent on the hardware being available and affordable. To the extent that hardware sales are hindered through policies such as the tariff which raise hardware prices, the software/applications market will also be retarded. A tariff on micro-computers is justified only if a hardware focus is shown to be the way to develop the market and if it is demonstrated that a tariff will be successful in promoting a hardware industry in Canada which, in the long run, will be able to compete on its own without the tariff. The first condition has been rejected by our analysis and the second condition is highly questionable.

Consistent with the emphasis of our analysis on the personal computer as the standard terminal device, without restricting the market to personal computers as the only terminal device, is consideration by government of a policy of tax incentives to consumers to purchase a personal computer or other designated terminal equipment.

This list of potential policies which government might consider could continue, but it is not the purpose of this report to make recommendations on specific government policy initiatives. Rather, the purpose is to point out how what government does decide to do or not do will influence the development of the mass market and to illustrate the role which government could play if the goal and priority of developing a mass market for computer-communications services is accepted by government. Before considering the question of goals, however, one other point should be made.

Direct Government Benefits

It was noted in Chapter Four that government participation in the computer-communications services market might be justified on the basis of direct financial benefits to government. The medium could be used to provide government information, to improve social service delivery or make social service delivery more cost effective, to do

likewise for education, to tender government contracts, and so on. All of these could be cost-justified uses of computer-communications services by government acting as a producer. On the consumption or demand side, government might also be a buyer of services produced by others, again on a cost-justified basis.

This possible aspect of government involvement in the market is important to note for two reasons:

1. It does not, in itself, rest on any explicit goal(s) government may adopt for the market; rather it is based on government's own budgetary considerations and general efficiency considerations;
2. It could provide a basis for government subsidization of public access terminals, services for disabled, aged or impaired citizens, education-related services, etc., which are based on private benefits realized by government rather than social benefits.

These benefits may or may not be large, and it is likely that they would only be fully realized once the market has developed. If they promise to be substantial, however, and if government does adopt explicit goals in favour of market development, early adoption/implementation of government uses/usage of the market could inject an additional revenue stream and range of service offerings that would accelerate the rate of market development. Apart from this, however, is the more fundamental point that this form of government involvement in the market is independent of any social or economic policy goals, outside of government efficiency.

Social/Economic Goals

In terms of social/economic goals, the government has, to date, failed to indicate officially precise goals for the computer-communications sector. Government has neither indicated the priority of this sector relative to others nor the relative priority of different goals within the sector.

In part, the delineation and priorization of government goals for the computer-communications services industry have been confused by discussions which focus on micro-electronics based industries at large rather than computer-communications services, the dominant attention which has been paid to Telidon technology, and, arising from the above,

the dominant attention which has been paid to hardware related issues rather than service related issues.

There have been some unofficial statements of goals. In 1980, Bernard Ostry, then Deputy Minister of DOC, set five guiding principles for information technology markets:

1. freedom of expression (including "both freedom of speech and freedom to create")
2. freedom of access (on the part of users for the "full range of interactive and one-way . . . services")
3. freedom of enterprise
4. freedom of development (which involves issues of "economic independence," "technological sovereignty," and "cultural integrity")
5. freedom to enjoy privacy (in terms of individuals, corporations and the state).[8]

These are all potentially valid goals. But, they also, in a number of instances, conflict with one another and are ambiguous in a number of very important respects.[9]

Ostry's statement parallels very closely a slightly earlier statement by John Madden,[10] at the time a senior official in DOC. Madden lists four objectives:

1. to ensure that public access is provided to a wide variety of information providers through low cost and easy to use terminals from any part of Canada;
2. to give information providers access to the public and to ensure that they encounter the lowest possible barriers to entry into the market place;
3. to ensure that the resultant benefits accrue, to the maximum extent possible, to Canadian industry;
4. to ensure that the rights of individuals are not transgressed.[11]

Madden's goals, like Ostry's, are ambiguous in many respects and do not recognize potential conflicts, hence trade-offs, between goals. It is noteworthy, however, that both accept implicitly the desirability of development of computer-communications services. It is also noteworthy that they do not question the impact of the goals they recommend for the development of the market.

As an example of this latter point, consider Ostry's first goal (freedom of expression) which is paralled by Madden's second goal (IP access to the market). Both goals endorse the principle of guaranteed access by IP's to the market. But, what does that mean? If it means simply the right of anyone to list a service for sale and to have access to the public carrier network to deliver it, that is one thing. But, if it means that anyone, on demand, could be listed on any service provider's system, that is quite another thing. Though the latter interpretation may be quite defensible on egalitarian, social welfare grounds, it is not likely to be defensible on economic grounds. It might mean, for example, that the focused applications strategy discussed previously could not be realized because system operators would have no control over the content listed on their system. It might mean pushing the market in the direction of the monolithic structure discussed in Chapter One. This result, in practicality, is not only inappropriate from the vantage point of meeting consumers' characteristics preferences but is also at odds with what the limited marketing experience gained in the last five years has shown to be acceptable to consumers.

This illustration shows that different objectives will have different implications for the shape of the market and, in the process, for the growth of the market and the timing of that growth. To say that everybody must be allowed to participate as IP's, even as qualified by Madden ("lowest possible barriers"), could significantly alter the marketing approaches open to system operators, the structure of the market in terms of participants, integration, and pricing and the user potential of the market in the short run. There may be ways of reconciling this objective with economic objectives[12] but the shape of the market will be necessarily influenced under any circumstances.

In general, computer-communications services could be regarded by government as serving one or more of the following general policy objectives:

1. industrial benefits
2. employment benefits
3. economic sovereignty
4. cultural integrity
5. technological sovereignty

6. rights of citizens
7. competition
8. social welfare

No inconsistency between the analysis of Chapter Five and an industrial benefits/employment benefits objective exists if benefits in these two cases are defined in terms of software and applications rather than hardware. As previously argued, a hardware focus is not likely to be successful while a software/applications focus could be quite successful in terms of Canadian participation both in the Canadian market and in external markets.

The same point can be made with respect to economic sovereignty. Without becoming a completely closed economy, Canada cannot be sovereign in everything if sovereignty is interpreted to mean self-sufficient. Choices must be made. In this case, a focus on software/applications, content, rather than hardware, holds much greater promise.

Cultural integrity has the same implication. Content is clearly the fundamental concern in terms of culture. Canadian-built machines which display U.S. content do not promote Canadian culture. Here, perhaps more than with any of the other goals, rapid market development in Canada may be of primary importance. The existing on-line data base industry is already heavily dominated by the U.S. Mass market services are now beginning to emerge in the U.S. If Canadian services do not develop quickly, the market may be filled by U.S. operators who will, at that point, have the advantages of an established system, not to mention advantages which the larger U.S. market base may provide.

Technological sovereignty is not a goal compatible with the market development scheme set out in Chapter Five if technology is interpreted in hardware terms. It is, however, important to realize that technology does not include just machines. Software is also a technology. Interpreted in this way, technological sovereignty poses no problem

Citizens' rights is a multi-faceted goal. Interpreted to mean guarantees and protection of privacy, the goal may be almost a necessity for many consumers in terms of building and maintaining their

confidence in the system. In this case, there is definitely no conflict with the market development scenario of Chapter Five. Interpreted to mean guaranteed access for users, and/or information providers, a problem could arise. The information provider case has already been discussed. For guaranteed user access, if it is not subject to an ability-to-pay criterion or if it means access to all services rather than any service, certain elements of the preferred market development scenario will be impossible. The definition of the mass market used here includes its being available to the general public. However, this availability is intended to be in contrast to closed-user groups where entry is restricted on some basis other than ability and willingness to pay. It does not mean guaranteed access. A goal of guaranteed access could influence the adoption of focused applications, system financing, price structures, hardware orientation and profitability. None deny that guaranteed access may be a very important goal. The potential for computer-communications technology to widen the information gap between rich and poor, well-educated and less well-educated has been mentioned earlier. Guaranteed access, in itself, will not solve this problem, but it may help make a solution possible. Ultimately, much depends on the willingness of government to assume the responsibility for implementing this goal if government chooses to adopt this goal. Public access terminals supplied by the government or government subsidies of certain user groups (low-income, for example) are possible solutions which do not shift the burden of meeting the goal to the industry and do not retard or distort the market's development as a result.

Competition is stressed by our scenario, in terms of maintaining flexibility in technology options, content options, pricing options, etc. The support recommended for gateway networks would, so long as they are offered on a non-restricted basis to both ends of the market (to users and to information providers and/or system operators), promote competition. Very importantly, the value of the overall system will be enhanced for consumers because of the greater diversity and choice they would have. Competition is the best way of achieving this end. Two sub-issues related to competition are non-Canadian, in particular U.S., competition and the economics of the Canadian market place.

Foreign competition in services is a concern that could have implications for our development scenario, particularly in terms of influencing price. But, there is some basis for believing that Canadian producers will be able to compete in content/software areas. The economics of the Canadian market place argument takes note of the relatively small size of the Canadian market compared to the U.S. (In population terms, Canada is approximately one-tenth the size of the U.S.). Because of this smaller size, Canadian producers may be unable to achieve the same scale of operation as their U.S. counterparts and, therefore, may not be able to compete in terms of price and/or, if there is too much competition, everybody will operate at a scale below optimum and prices will be higher as a result. If Canadian produced software is competitive, however, there will be an export market potential which will, for such cases, do away with this market size argument.

Conclusion

In the Introduction we noted the focus of this study was to examine the forces involved in the development of a mass market for computer-communications services. No specific effort was to be made to explore the appropriate use of the technology nor the potential consequences, negative or positive, that could accompany its widespread use. In dealing with the role of government and the formulation of government policy in Chapter Six, other social welfare goals than those already mentioned, such as rights of citizens, cultural integrity, assistance to the aged, handicapped or rural residents, reduction of technology-induced unemployment, and so on, which are basic to equity considerations and represent a potential conflict with a market development objective were also not adequately discussed.

These omissions are serious because the subjects are worthy of thoughtful and extended consideration, particularly as they introduce important political considerations for governments. Treating these subjects seriously, though, would have required dealing with issues far beyond the scope of the present investigation, including the assimilation and interpretation of a vast array of conflicting data. What is obvious even from a cursory review of the data is that the social, economic, and

political issues emerging as a result of the technological innovations produced in the past few decades have become increasingly complex and interdependent and are polarizing society. This has occurred because the ability to develop a technology far exceeds the capacity of scientists and politicians to control or predict the social consequences of its implementation. In short, technological advances have far outstripped public understanding and political wisdom. Fifty years ago, Lewis Mumford anticipated this condition:[13]

> "only by a deliberate act of restrictive self-discipline on the part of science and technics, will the human agents concerned be able to concentrate sufficiently on those decisive inventions in the realm of morals, politics, and psychological self-direction which will restore the balance to our civilization as a whole."

Nevertheless, despite such problems, the main argument of this study remains that computer-communications services is a technology which will transform Canadian society and has the potential of producing immense benefits. To do this, though, widespread usage must be achieved, and this requires a mass market. How the mass market develops, who participates, the terms for this participation, what the market does, and who benefits are important questions of government policy. The ability to find solutions will rest, in great measure, on government's willingness to assume the responsibility for implementation as well as definition. Given the range of possible options, finding the appropriate mixture between concept and design, wishes and needs, will not be simple.

Finally, the study contends that unbridled market development is obviously not the best strategy and so the market development scenario set out in Chapter Five is not a scenario of unbridled development. What has been demonstrated is that the various policy goals which government may have can be interpreted in ways which are consistent with the scenario or can be reconciled with it. When this is not the case, the goal has a different interpretation. But, as shown, many of these alternative interpretations (e.g. a hardware versus software interpretation of the industrial benefits goal) may not be superior choices. Services, such as content and applications, are what matters and what should concern the industry, consumers and government alike.

Notes

1. This means that the net social benefits must be large enough relative to the size of the subsidy to yield a social rate of return that is commensurate with the opportunity cost of the government funds devoted to the subsidy program.

2. Hickling-Johnston, op. cit., p. 28.

3. This figure is quoted in several different newspaper sources. See, for example, Chevreau, "Videotex Service set for Next Year," op. cit., p. B17 and K. LaPointe, "Deputy Minister doubts Telidon will Reach Goal," The Citizen, Ottawa, January 17, 1984, p. 3.

4. In January 1984, $4.9 million in software development grants were awarded. (LaPointe, op. cit.)

5. Reported in Chevreau, op. cit., p. B17.

6. Uncertainty arising out of the regulatory process is cited by some cable companies, for example, as a major reason for delaying plans for introducing service. Quite understandably there is a reluctance to spend a great deal of money modifying plant and setting up service offerings if the regulator has not yet granted permission to do so.

7. The running of most of the Telidon field trials, for example, was in the hands of carriers. But if content/carriage separation is imposed on carriers in this area, they will not be system operators or content providers. A great deal of expertise has been built up in a sector which may not be able to take advantage of it and lost to others who might.

8. B. Ostrey, "Keynote Address," in Communications, Computers, and Human Settlement, Proceedings of the Nineth Annual Urban Studies Symposium, York University, March 1980, p. 4-5.

9. For a critical discussion of Ostrey's five principles see Lesser, op. cit., pp. 25-29.

10. J. Madden, "Videotex in Canada," Delta Dialogue Series Seminar No. 9, Toronto, May 1979.

11. Ibid., p. 6.

12. One possibility would be to create a class of common service providers analogous to the concept of common carriers. (See Lesser, op. cit., p. 94.)

13. L. Mumford. Interpretations and Forecasts: 1922-1972 (New York: Harcourt Brace, Janovich, 1973), p. 281.

APPENDIX A
DEFINING THE MASS MARKET

What is a mass consumer market for computer-communications services?

One straightforward and obvious answer is to say that it means widespread usage or implementation. This definition does not, however, take one very far. It leaves unanswered such questions as whether a mass market is a home or residential market, a business market, or both; whether the market is defined in terms of the industry as a whole, individual service providers, individual services or individual data bases; and whether the market is defined by the criteria for commercial viability or by some other criteria; and so on.

As a way to begin to answer these questions and others, we will consider the ways in which the term mass market has been used by various observers/commentators of the computer-communications industry.

A Review of the Literature

Tydeman defines a mass market as "widespread implementation."[1] Within the generic class of computer-communications services labelled videotex,[2] the market is defined as all videotex users; that is, it is not defined according to a particular service offering or service provider. This definition does, however, distinguish videotex services from non-videotex computer-communications services; thus,

implicitly, the market is being differentiated along technology lines. The other important characteristic of Tydeman's definition to note is the use of the word "implementation." In other words, Tydeman defines the mass market in terms of actual users rather than potential users. Further, he does not explicitly distinguish between users and buyers or between users and usage. As further discussion will show, these distinctions may be important.

Baird[3] offers a slightly different or modified concept of the mass market from that of Tydeman. His definition also rests on the number of users, but he explicitly defines the requisite number of users in terms of a profitability criterion.

> But, the ISP's (information/service providers) will only really be interested in providing their dollar input if they can see a fair return for their spending. In other words, if there are enough users of their information or service to benefit them in the way they desire.[4]

Very significantly, Baird's definition of mass market is put in the context of individual system operators. He discusses the "critical mass" of users, the number of users an individual operator requires for profitability. This critical mass is seen as a function of two factors: the spending power of users and the cost of operating the system. Baird's concern is with videotex service, which, among computer-communications services, he categorizes as the most expensive because of its full colour and graphic capability and the large capacity of the system as a result of its being aimed at the general public. The latter, in turn, makes the average spending power of users less than, say, for a business-oriented service. The result is to end up with a relatively large critical mass for videotex system operators compared to non-videotex computer-communications services.

There is something of a tautology to Baird's argument. Costs are higher and spending power lower because of the assumption that videotex is being offered to a large number of users. In turn, this means that for the service to succeed it needs to have a large number of users.

Two final points should be noted about Baird's discussion of the mass market:

1. The profitability criterion he is using is, in effect, a break-even

one, i.e., the critical mass is the minimum number of users required to earn a fair return;[5]

2. Implicitly, his argument on the implication of the relatively high cost of videotex service assumes a high proportion of fixed costs for a system engineered to a particular size and with certain colour and graphics capability. In other words, he is not basing his definition on an economies of scale argument but rather on the ability to lower average cost per user by spreading fixed costs over a larger number of users.

Considering these two points more carefully, two further notions or rationalizations of the meaning of mass market can be generated.

First, it is possible to think of a mass market in terms of maximizing the number of users per system operator so as to maximize profits rather than in terms of the minimum number of users required to realize simply a fair return per system operator. In other words, the profitability criterion could be defined in terms of improving profitability rather than simply achieving a break-even level of operation. In the short run, these will be the same only by coincidence. In the long run, they will coincide only if the market is a perfectly competitive one, an occurrence which is not very likely.

Secondly, if there are economies of scale to be realized by system operators, this becomes another basis for a focus on mass market development. Baird's analysis, as noted earlier, is not an economies of scale argument. Rather, Baird is arguing that, having engineered a given size system which has a large user capacity, a large number of users will be needed to make such a system pay. By contrast, an economies of scale argument would imply that the larger the scale of operation, the lower per unit costs will be. For example, a system engineered for 10,000 users will have a lower cost per user than a system engineered for 1,000 users, if economies of scale are present. The likelihood of such economies of scale being present is an issue that is beyond the scope of this study to answer. Economies of scale are, however, a theoretical possibility which, if present, would provide a basis for seeking mass market development defined in terms of number of subscribers per system operator. Such development would, of necessity, imply a small number of large system operators.

Parkhill[6] develops a notion of the mass market which is different from either Tydeman or Baird. To quote Parkhill directly:

> "Basic to this picture is a view of the evolution of computing and communications systems that sees them coming together in the form of a universal, functionally-integrated but institutionally-separated information distribution system metaphorically called an "Electronic Highway Network."[7]

For Parkhill, the mass market is a kind of "market for the masses." In other words, it is not just an economic market but rather one that has major social overtones. Parkhill's aim is to "make the potentially revolutionary benefits of computer power available to everyone."[8]

Parkhill's sense of the mass market is echoed quite closely by the Science Council of Canada:

> It is becoming apparent that we are going to need (and therefore have) or are going to have (and therefore need) a public use of computers. The public at large will be able to dial up a computing facility appropriate to their needs.[9]

In the case of both Parkhill and the Science Council, the market is defined without respect to individual service operators. Nothing in either definition, however, suggests that the market is seen as monolithic, although Parkhill does talk of the "Electronic Highway Network," which would tie all of the parts together.

There are, however, conceptions of the mass market which are monolithic. Indeed, the early Prestel system in the U.K. was based on this notion.

> The effort was driven by the quest, current then, for a universal data base. It was felt that all the information that a nation needs to operate, economically, socially and culturally, could be stored on one computer, or collection of computers, and provide universal access by/to all citizens.[10]

Gordon Thompson dismisses both the desirability and the practicability of this approach:

> The inappropriate use of the big is beautiful idea in applying information technology has produced some mongoloids. The "computer utility," an idea from the early development period of information technology, was clearly based on the structure of existing industrial public utilities, and exhibited the heavy, centralist, structural notions of the older technology. For many real and valid reasons, there will never be a collecting together of "raw computer power" into one giant, centralized machine serving a whole country or, for that matter, a whole city. The big-is-beautiful idea

> applies to information technology in a very small, weak fashion.[11]

Thompson goes on to describe what he calls "the information market-place,"[12] a market where information is the good which is exchanged. Thompson envisions the mass market as:

> The key to releasing the full socio-economic potential of the new information technology, with its communications facilities, computers, and intelligent terminals, and the like, lies in designing a suitable infrastructure wherein the technology encourages the content suppliers and users to interact in a synergistic way. Such an infrastructure could produce a new mass medium.[13]

Thompson's mass market would not feature centralized production but, rather, would be pluralistic in nature. It would not deliver "material chosen for appeal to the widest audience,"[14] but "tailored material, specifically aimed at small-user populations."[15] Thompson adds another important qualification to his definition. Not only is his mass market one which has a large number of users but also one where the time devoted to participating in the market is significant.

> . . . users would have to spend significant quantities of time using this new medium if there were to be economically significant revenues flowing from these usages. For the electronic information market-place to mean anything economically, people will have to spend time in that market-place. Not just fleeting moments, but "chunks" of time.[16]

Daniel Bell has also commented on the question of market organization for computer-communications services. He discusses two alternatives: "a single computer utility that would centralize and provide a single source for information and transmission of data for consumer use . . . [and] a completely unregulated, competitive market system in which different 'producers' would be free to set up diverse informational services and transmission would be through cable, microwave, or satellite communication operated by different combines, each competing for the business."[17]

Bell reviews the relative merits of each of these alternatives and, on balance, decides in favour of the market system. He believes this system would best realize the goals of what he describes as the information society, a conception which has social rather than purely economic overtones similar to those of Parkhill's conception of the mass market discussed earlier.

The 1979 Hickling-Johnston report[18] to the Department of Communications viewed the mass market in economic terms but included some new considerations:

> Inherent in the relentlessness of falling costs is a new set of product opportunities in consumer markets as opposed to the customary markets for digital devices which have been oriented to the producer markets in business and government. One is drawn to the view that 1980 will mark a discontinuity in the industries associated with digital technology, where consumer products tailored and priced to a mass market assume a prominence and character all of their own. Mass markets offer scale economies in the production of devices, but more importantly they offer scale economies in the software which converts those devices into usable services. The mass markets provide the volume potential which permits pricing to capture that volume. As well as affordable prices, the mass market must cater to an essentially computer-illiterate clientele, and will require a very high level of technical transparency in the devices and attendent services offered.[19]

Thus, the Hickling-Johnston view of the mass market is one which does not include business and government users; offers economies of scale in the equipment, i.e., hardware, market; offers economies of scale in the software market; and is made up of ordinary people, a computer-illiterate clientele.

The two new considerations which Hickling-Johnston add to the discussion are economies of scale in hardware and in software as part of the basis for the mass market. The fact that business and government users are specifically excluded is noteworthy.

A 1980 report for the Department of Communications undertaken by R.W. Hough and Associates[20] examines the probable growth of the videotex market in Canada to 1990. Although the report addresses only the videotex market, not the mass market for computer-communications services, it does, clearly, appear to equate the mass market with the videotex market, thereby distinguishing the market in technology terms as per the Tydeman definition noted earlier. It also presumes that a major emphasis of the videotex market will be home users versus business users. While this condition is not as restrictive as that of Hickling-Johnston, it is very close to being so. Finally, the report explicitly attempts to estimate demand and, on the basis of these projections, concludes, "If Telidon could reach the market

penetrations suggested herein, that would be a very good market indeed."[21] Thus, implicitly, the report seems to be thinking in terms of some minimum threshold necessary to establish the market. Unlike Baird, however,[22] this minimum threshold, or what Baird calls the "critical mass," is defined in terms of the entire videotex market, not individual service operators.

Kurchak[23] defines the mass market in terms of "services to be made generally available to the public."[24] Kurchak notes that:

> [r]esearchers specializing in videotex have pointed out that data base services may operate profitably selling a specialized service to a small audience of terminal owners at relatively high prices as has currently been done; or, theoretically, with a large audience of terminals one may offer services cheaply and still enjoy profits. However, in the interim phase when the market of terminals is neither of a specialized-audience sort nor of a mass audience size, it will be very difficult for providers of services to get adequate returns.[25]

Kurchak's definition, either implicitly or explicitly, delimits the mass market as follows:

1. The market is defined in terms of number of terminals rather than number of buyers or number of users or other possible measures such as dollar volume or hours of usage; none of these are necessarily the same and some obviously differ;
2. The market would offer lower prices to the terminal-audience, which implicitly assumes that low prices are a necessary characteristic for gaining a mass audience;
3. The source of this lower price is not spelled out; conceptually, it could derive from the ability to spread high fixed costs over a larger number of customers, economies of scale in software and/or data base provision or economies of scale in production of terminals; this latter point might be assumed to be quite important in Kurchak's case owing to her definition of the market in terms of terminals.

In a more recent study for DOC the importance of economies in hardware production are emphasized by Booth and Wills:[26]

> The importance of standards lies in the fact that until a universal standard is adopted, mass production of equipment for display is not likely to take place.[27]

Wills and Booth go on to note, however, that "hardware . . . is not going to be the way to gain the greatest penetration of Telidon."[28] They argue that content development is just as important. They also note that "developing a mass encyclopedia-like information retrieval capability has . . . problems."[29]

Interview Responses

In a number of the interviews carried out as part of this present study, the industry participants/observers offered their own versions of the meaning of the mass market concept. Many of these parallel closely various of the definitions from the literature just reviewed. Others, however, differ in certain respects.

For a number of interviewees, the mass market was perceived in monolithic terms, such that a disaggregated market was seen as an alternative to the mass market rather than one possible manifestation of the mass market. For others, the monolithic concept was dismissed out of hand. In one interview case, the mass market was defined in terms of the installed base of the carrier for the service and the share of that base enjoyed by the individual service operator of a computer-communications service.[30] Implicitly, this view appears to assume that any given service will employ only one distribution or carrier system. Technologically, there is no reason this should be the case[31] but, in economic terms, it is possible that it could prove to be the preferred approach. This view also implies a possible confusion between the notion of a mass market and the notion of a target market.

Not surprisingly, most service providers interviewed see the market share of individual service providers and/or services as a crucial variable in any definition of the mass market although they may view the market itself in more aggregate terms. All interviewees regard home or residential service as a necessary component of the mass market though some define it as strictly residential while others define it as both business and residential. For some, volume, not type of customer, is the crucial variable.

An interesting argument made by some interviewees was the notion of specific functions being mass market services in their own right. The two functions most often mentioned in this regard were

electronic messaging or mail services and transactions services, in particular tele-shopping and tele-banking. Information retrieval was also mentioned by several interviewees but, in so doing, they noted that they did not regard information retrieval as the basis for building the market.

There is a certain tendency on the part of some service providers to try to carve out market niches for themselves. Thus, they do not necessarily think in terms of a mass market but in terms of their own market. The NABU Network, at least at present, appears to be an example of such an approach.[32] Infomart also placed a great deal of emphasis on the need to target the service and the content of the service to particular audience groups.[33] One interviewee noted that market niches might, in fact, be highly dispersed geographically, hence requiring the use of mass media as a marketing tool to reach this audience. The use of mass marketing techniques was thus seen as one way of defining a mass market where individual product offerings were, however, highly individualized.[34]

In terms of marketing theory, this latter notion of a mass market is an accepted one. One marketing definition of mass market, for example, is the following:

> A mass market includes all persons in the country who can be reached by transportation facilities and the mass media.[35]

If, for the case of computer-communications services, communication facilities are read in place of transportation facilities, this statement is precisely the view expressed in the just mentioned interview. The marketing definition goes on to note that there are two alternative views of the mass market which can be considered consistent with the general definition.

First, there is the case where market preferences are treated as homogeneous; that is, the market is presumed to be made up of "people with want patterns . . . remarkably similar from person to person."[36] This means that the product presented to the market is a compromise. It is the product which is "somewhat acceptable to everyone rather than precisely what was preferred by any part of the total market."[37] This approach is what has been referred to here as the monolithic approach or definition of the mass market.

The second mass market case is the segmented market approach. This, in certain terms, "represents a partial abandonment of the mass market concept,"[38] insofar as the conventional view of the mass market assumes some level of product homogeneity. In fact, however, the real difference between the homogeneous mass market approach and the segmented market approach is that the former concentrates on the traits of the majority or plurality of buyers while the latter emphasizes minority traits and divides the market into segments in order to accomplish this end.[39]

In this way of looking at things, product differentiation as defined in marketing terms is not to be confused with market segmentation. In the latter case, the product is differentiated while the appeal to customers may be, and usually is, universal, making use of mass media and other mass marketing techniques. Product differentiation for marketing specialists, however, may involve a single product which is, however, distinguished by different sales appeals to different segments of the market. Thus, product differentiation implies, in marketing terms, several different targets for promotion. Another term for product differentiation, defined in this way, is "market aggregation."[40]

In this marketing definition which defines a mass market in terms of mass media promotion, an interesting question emerging is whether mass market computer-communications services are themselves mass communication services. Mass communications has been defined as:

> Systems of messages and means of generation and transmission (human and technological) that have three properties: first, the messages and the media are intended for a large and spatially dispersed audience; second, the messages and the media are sufficiently standard to be readily comprehensible to and usable by a large fraction of the intended audience; third, the messages are available, because of media availability, to a large fraction of the relevant population.[41]

What is obvious from this definition is that for mass market computer-communications services to qualify as mass communication services they would have to be of the monolithic or homogeneous mass market variety. It is interesting to speculate whether preconceptions of mass communications systems held by many of the first participants in the mass computer-communications services market led to the monolithic view of the market being prevalent for some while.

A Summary of Views

Table A.1 provides a summary of the various characteristics attributed to the mass market for computer-communications services by the literature/industry observers reviewed. An examination of Table A.1 reveals that some of the attributes or characteristics of mass markets identified by different individuals are contradictory, while some can be seen as subsets of others.

In technological terms, there is, as has already been observed, a tendency to distinguish videotex from non-videotex services and, in particular, to define a mass market for videotex services alone. This distinction is somewhat confusing because the term videotex is used in different ways by different commentators. For some, it is a generic term for any computer-communications service having a widespread or large audience.[42] In this case, it becomes all computer-communications services subject to other characteristics imposed on the definition of mass market. In purely technical terms, however, videotex means something else. Pure videotex is a system where the data base is constructed and retrieved in page format. In other words, it is not a full-text service, either in organization or presentation. For the present time, at least, there appears to be no good reason to impose this limitation on the definition of mass market. To avoid confusion, videotex will be defined here in strictly technical terms and the market, therefore, will be defined in terms of computer-communications services in general. The only technological constraint imposed on the definition will be that services be computer-communications services as defined in Chapter One.

In terms of audience, there are several alternatives shown in Table A.1. Which of these is most relevant will depend on whose perspective is being taken into account. Service providers or system operators will be concerned with their own customer base, actual or potential. To the extent that number of customers and usage per customer are substitutes for any given sales volume, both numbers and usage are likely to be important. The number of accessible terminals or the installed base of the carrier may both be good indicators of potential audience for a given system operator but only if supply and demand are in equilibrium in the terminal or carrier markets.

Table A.1

Summary of Mass Market Characteristics

—Alternative Views

1. Technology
   - videotex vs non-videotex
   - all computer-communications services

2. Audience
   - number of actual users per system operator
   - number of actual users per total industry
   - number of actual users per service
   - number of accessible terminals
   - number of customers
   - number of potential users
   - number of subscribers/installed base of carrier
   - high usage per user

3. Audience characteristics
   - general public
   - computer illiterate
   - residential
   - non-business and non-government
   - residential plus business plus government
   - low price threshold
   - average income constraint

4. Economic considerations
   - high fixed costs (absolute and relative)
   - economies of scale—system operator
   - economies of scale—hardware
   - economies of scale—software
   - use of mass media advertising
   - viability per system operator
   - viability per overall market

Table A.1 (Cont'd.)
Summary of Mass Market Characteristics
—Alternative Views

5. Service Characteristics
   - universal data base
   - "information market-place"
   - targeted audience applications
   - computer utility—single service provider
   - decentralized market—many service providers
   - equipment/hardware compatibility
   - software compatibility

It is not clear, however, that the perspective of the system operator is the most useful one for our purposes. Insofar as services offered by different system operators are competing ones, the markets of different service providers will overlap. This overlap would tend to move us towards an industry wide definition of audience whether we are using the system operator or individual services as the base unit for examination of the supply side of the market. Regarding this latter distinction, it does not appear to be necessary to limit our definition by dealing with either system operators or services exclusively. Depending on the situation, both of these may be relevant ways of disaggregating the total market. This point will be made more obvious in Chapter Two, where a taxonomy of computer-communications services is set out.

The distinction between customers and users may be a relevant one, depending again on the perspective from which the market is viewed. As a general proposition, customers can be assumed to be users but users will not necessarily be customers. From a service operator perspective, this distinction may not be relevant. If service providers are interested in dollar sales and if pricing of services is usage-sensitive in some respect, then having someone use someone else's code/account will not matter. From a public policy perspective, if an objective of public policy is to maximize persons using the system or having access

to the system, then the committed customer list of the service operator will underestimate the size of the market. If there are public access terminals located in hotels, shopping malls, libraries, etc., then, again, the number of users will exceed the number of customers. For advertisers, if the systems involve sponsored services, users will be more relevant since advertisers will be most interested in total audience reached. If the pricing structure for services is not usage sensitive, then system operators may care whether there are more users than customers. Overall, it would appear to be best to err in this case on the side of enlarging the audience. Thus, we will define the audience in terms of users rather than customers or terminals while noting that for some purposes both customers and terminals may be relevant measures of audience.

Finally, with regard to audience, there is the question of actual versus potential users. Because the analysis of Chapter Three is concerned with identifying demand characteristics which will determine or influence the entry of users into the market, potential users will be adopted here for definitional purposes. When, and if, the market reaches maturity, actual users will become more meaningful.

Audience characteristics shown in Table A.1 are relatively straightforward to deal with. A potential mass market clearly must encompass the general public. It is important to emphasize, however, that this does not mean that individual services or systems cannot be targeted to selected groups. By the same token, general public does not mean an exclusive emphasis on home or residential users. For example, in many cases the dividing line between business services and residential services is a blurred one in terms of the physical location of access. Personal banking or shopping might be done from the office while a business electronic messaging service might be accessed from the home. The same is true for government services and users. Product characteristics may well differ between services intended for a residential audience versus a business audience but, put in these terms, these services become simply one level of product differentiation in a segmented market rather than separate markets. The price and income thresholds may need to be lower to attract a mass audience for a given service or system than if the service is aimed at a small, highly

specialized audience. This characteristic, however, is relative, not absolute, and even in relative terms it may not be true. The price or income threshold will depend, other things being equal, on the value of the service to the individual user. The higher the value of the content and/or the medium is, the higher the price a given user will be prepared to pay or the higher the proportion of income the user may be prepared to devote to the service. Still, there is no question that affordability will also influence the number of participants. What is important to remember is that the cost of the service itself is only one of the user's costs. There is also the cost of the terminal equipment which may include a display unit, a modem and carrier service as well as the terminal itself, and the communications cost of using the service if this is not included in the price of the service itself.[43] Account must also be taken of time, learning costs and other non-cash cost components. Thus, it will be more relevant to talk about price and income constraints in terms of total user costs rather than just the cost of individual services.[44] Having said this, however, no price or income constraints will be imposed on the definition of mass market. Rather, in keeping with defining the audience in terms of potential users, income and price will be taken as conditions governing entry into the market in terms of actual users and the extent of usage once in the market. The economic considerations identified in Table A.1 also fall out of our definition for this same reason.

Economies of scale, be they in hardware, software or per system operator,[45] will influence the mass market as far as they contribute to lower prices. Similarly, the impact of high (relative and absolute) fixed costs will work in the same manner. Therefore, the definition of a mass market will not incorporate these characteristics even though these characteristics may be important in shaping the mass market. By the same token, viability considerations, either for individual system operators or the overall market, will be viewed as consequences of the market as defined rather than treated as part of the definition. To argue, as Baird does,[46] that profitability is the criterion defining the market and that a mass market is one large enough to justify the investment in a service intended for a large market is simply a tautology.

The use of mass media advertising or other mass marketing techniques will also be excluded from the general definition of mass market. While mass marketing techniques may be very important to market success and may be a necessary or essential component in creating a mass market, marketing techniques, per se, do not define the market.

The same is true of service characteristics. There seems to be no necessary reason why a mass market need be defined either in monolithic terms or segmented terms or monopoly versus competitive market terms. Conceptually, any of these may be compatible with a mass market. It is important to realize, however, that the choices made in this regard are likely to influence the shape and success of the market. As Larratt has noted:

> . . . in North America today there is no single simple mass market. The mass market has disaggregated . . .[47]

Equipment and software compatibility will also be important determinants of the shape, existence and/or timing of a mass market for computer-communications services. These are not, however, necessary conditions for a mass market and, hence, are not included in the definition of mass market.

Definition

The definition of mass consumer market adopted here is, thus, as follows:

The mass consumer market for computer-communications services is one which:

1. involves widespread usage
2. involves services for both computer based information/content and remote connection of users via an electronic communications medium
3. is available to the general public, though not necessarily aimed, in the case of each individual offering, at a majority of the general public and
4. encompasses all classes of users, residential, business and government, actual or potential.

Obviously, this definition is very broad. It could be argued that it is, in fact, an underspecified definition. It has been stated as is, however, in order to demonstrate the lowest acceptable common denominator that can be gleaned from most of the existing work on this subject and, in the process, to provide a base, through broad, general definition as an initial framework for subsequent analysis.

Notes

1. Tydeman, op. cit., p. 3.

2. Videotex is defined by Tydeman as "the generic name to describe the provision of two-way information services . . . In addition, we also use the term videotex to refer broadly to the class of systems that provide electronic information to the home." (p. 2) This differs from a purely technical definition of videotex which would emphasize the input and output of videotex data in pages.

3. N. Baird, "Mass Market Videotex–There is a Better Way," Videotex Canada, 1, 4, 1983, p. 29.

4. Ibid., p. 29.

5. Ibid., p. 29.

6. Parkhill, "The Necessary Structure," op. cit.

7. Ibid., p. 93.

8. Ibid., p. 72.

9. Science Council of Canada, Communications and Computers; Information and Canadian Society (Ottawa: 1978), p. 18.

10. Larratt, op. cit., p. 20.

11. Thompson, op. cit., p. 7.

12. Ibid., pp. 29-33.

13. Ibid., p. 41.

14. Ibid., p. 42.

15. Ibid., p. 42.

16. Ibid., pp. 55-56.

17. D. Bell, "The Social Framework of the Information Society," in T. Forester (ed.), The Microelectronics Revolution (Oxford: Basil Blackwell, 1980), pp. 533-534.

18. Hickling-Johnston, op. cit.

19. Ibid., p. 1.

20. Hough, op. cit.

21. Ibid., p. 146.

22. Baird, op. cit.

23. M. Kurchak, Telidon: The Information Providers (Ottawa: Department of Communications, 1981).

24. Ibid., p. 2.

25. Ibid., p. 7.

26. Booth and Wills, op. cit.

27. Ibid., p. 6.

28. Ibid., p. 33.

29. Ibid., p. 33.

30. Personal interview with Time, Inc.

31. Technologically, interactive services could be carried by telephone carriers, cable carriers, or by direct satellite transmission. One-way broadcast-type services, such as teletext, can be done through TV, cable, satellite or FM radio.

32. NABU considers their typical user to be family units with above average income and children between the ages of six and seventeen, who regard games as too limited and stand-alone computers as too complicated and for whom purchased software and accessories would be too expensive. (Personal interview with NABU.)

33. Infomart asserted, during the course of a personal interview session, that to be relevant, the mass market must be defined in terms of the number of subscribers to a service rather than the number of customers of a service provider.

34. Interview with GTE Telenet.

35. R. Gist, Marketing and Society (New York: Holt, Rinehart and Winston, 1971), p. 226.

36. Ibid.

37. Ibid.

38. Ibid., p. 228.

39. Ibid., pp. 228-229.

40. Ibid., pp. 230-231.

41. D. Bobrow "Mass Communication and the Political System," in W. Davison and F. Yu (eds.), Mass Communication Research (New York: Praeger, 1974), pp. 93-94.

42. This is, for example, the way in which Tydeman, op. cit., uses the term.

43. The Source, for example, charges on the basis of connect time which is inclusive of communications cost when the packet switched network is used and there are no marginal costs of accessing the packet network.

44. It is important to note that there is a major difference in this regard between the decision to join the first system/service and the decision to join subsequent systems/services. For the latter, terminal or equipment costs will no longer be relevant so long as the terminal equipment is compatible with the additional services.

45. Economies of scale per system operator, which are distinguished here from hardware or software economies of scale represent either economies on the administration side or economies which come from offering a multiplicity of services by the same operator. The latter is, in fact, more economies of scope than economies of scale.

46. See earlier discussion of Baird, op. cit.

47. Larratt, op. cit., p. 19.

THE MEMBERS OF THE INSTITUTE

Board of Directors

The Honourable John B. Aird, O.C., Q.C.
(Honorary Chairman)
Lieutenant Governor of Ontario, Toronto

The Honourable Robert L. Stanfield, P.C., Q.C.
(Chairman), Ottawa

Louis A. Desrochers, Q.C. (Vice-Chairman)
McCuaig, Desrochers, Edmonton

Richard Cashin
President, Newfoundland Fishermen, Food and Allied Workers' Union, St. John's

Claude Castonguay, C.C.
Président et chef de la direction
La Corporation du Groupe
La Laurentienne, Québec

Guy Chabot, c.a.
Raymond, Chabot, Martin, Paré
& Associés, Montréal

Roger Charbonneau
Président du conseil d'administration
Banque Nationale de Paris (Canada)
Montréal

Dr. Rod Dobell
President, The Institute for Research on Public Policy, Victoria

Dr. Henry E. Duckworth, O.C.
President Emeritus
University of Winnipeg

Dr. Regis Duffy
President, Diagnostic Chemicals Ltd.
Charlottetown

Dr. James D. Fleck
Faculty of Management Studies
University of Toronto

Peter C. Godsoe
Vice-Chairman of the Board, The Bank of Nova Scotia, Toronto

The Honourable William M. Hamilton, P.C., O.C., LL.D. Royal Commission on the Economic Union and Development Prospects for Canada, Vancouver

Grace Hartman
President Emeritus, CUPE, Willowdale

David Hennigar
Atlantic Regional Director
Burns Fry Limited, Halifax

T.E. Kierans
President, McLeod Young Weir Limited
Toronto

Roland J. Lutes, C.A.
Clarkson Gordon, Saint John

E.M. Mills
Vencap Equities Alberta Ltd., Calgary

Pierre A. Nadeau
Président du conseil, Dioxyde Canada Inc.
Montréal

Dr. Tom Pepper
Pepper Consultants Ltd., Saskatoon

Guy Roberge, C.R., Conseil
Clarkson, Tétrault, Ottawa

Claudine Sottiau
Ducros, Meilleur, Roy et associés Ltée
Montréal

Secretary

Peter C. Dobell
Director, Parliamentary Centre
for Foreign Affairs and Foreign Trade
Ottawa

Treasurer

Dr. Louis Vagianos
Executive Director, The Institute for Research on Public Policy, Halifax

Executive Committee

The Honourable Robert L. Stanfield
(Chairman)
Louis A. Desrochers (Vice-Chairman)
Claude Castonguay
Peter C. Dobell
Rod Dobell
Roland J. Lutes
Louis Vagianos

Investment Committee

Tom Kierans (Chairman)
Marcel Cazavan
Peter C. Dobell
Peter C. Godsoe
Paul Little

Council of Trustees

Members at Large

Dr. Stefan Dupré (Chairman)
Department of Political Science
University of Toronto
Doris H. Anderson, O.C.
Toronto
Professor Kell Antoft
Institute of Public Affairs
Dalhousie University, Halifax
MarieAndrée Bertrand
École de criminologie
Université de Montréal
Dr. Roger A. Blais
École Polytechnique de Montréal
George Cooper, Q.C.
McInnes, Cooper and Robertson, Halifax
James S. Cowan, Q.C.
Partner
Stewart, MacKeen & Covert, Halifax
Dr. Wendy Dobson
Executive Director, C.D. Howe Institute
Toronto
Marc Eliesen
Chairperson
Manitoba Energy Authority, Winnipeg
Emery Fanjoy
Secretary, Council of Maritime Premiers
Halifax
Dr. Allan K. Gillmore
Executive Director, Association of
Universities and Colleges of Canada
Ottawa
Dr. Donald Glendenning
President, Holland College, Charlottetown
Richard W. Johnston
President, Spencer Stuart & Associates
Toronto
Dr. Leon Katz, O.C.
Saskatoon
Dr. Leo Kristjanson
President, University of Saskatchewan
Saskatoon
Marilyn MacDonald
Halifax
R. Terrence Mactaggart
President, The Niagara Institute
Niagara-on-the Lake
Dr. John S. McCallum
Faculty of Administrative Studies
University of Manitoba, Winnipeg
Claude Morin
École nationale d'administration publique
Québec
Professor William A. W. Neilson
Faculty of Law, University of Victoria
Roderick C. Nolan, P.Eng.
Executive Vice-President, Neill &
Gunter Limited, Fredericton
Robert J. Oliveto
United Nations Secretariat, New York
Maureen O'Neil
Co-ordinator, Status of Women Canada
Ottawa
Garnet T. Page, O.C.
Calgary
Dr. Gilles Paquet
Dean, Faculty of Administration
University of Ottawa
Dr. K. George Pedersen
President, University of British Columbia
Vancouver
Professor Marilyn L. Pilkington
Osgoode Hall Law School, Toronto
Dr. David W. Slater
Chairman, Economic Council of Canada
Ottawa
Dr. Stuart L. Smith
Chairman, Science Council of Canada
Ottawa
Eldon D. Thompson
President, Telesat, Vanier
Marc-Adélard Tremblay, O.C.
Département d'anthropologie
Université Laval, Québec
Dr. Israel Unger
Department of Chemistry, University of
New Brunswick, Fredericton
Philip Vineberg, O.C., Q.C.
Phillips & Vineberg, Montreal
Dr. Norman Wagner
President, University of Calgary
Ida Wasacase, C.M.
Federation of Saskatchewan
Indian Nations, Ottawa
Dr. R. Sherman Weaver
Director, Alberta Environmental Centre
Vegreville
Professor Paul Weiler
Harvard Law School, Cambridge, Mass.
Dr. Blossom Wigdor
Director, Program in Gerontology
University of Toronto
The Very Rev. Dr. Lois M. Wilson, B.A., B.D.,
D.D. Co-Director
Ecumenical Forum of Canada, Toronto

Government Representatives

Joseph H. Clarke, Nova Scotia
Michael Decter, Manitoba
Jim Dinning, Alberta
John Ferby, Yukon
Honourable Lowell Murray, Canada
John H. Parker, Northwest Territories
Henry Phillips, Prince Edward Island
Norman Riddell, Saskatchewan
Jean-K. Samson, Québec
Gordon S. Smith, Canada
Norman Spector, British Columbia
Barry Toole, New Brunswick
John Tory, Ontario
David Vardy, Newfoundland

INSTITUTE MANAGEMENT

Rod Dobell	President
Louis Vagianos	Executive Director
Jean-Luc Pepin	Fellow-in-Residence
Gordon Robertson	Fellow-in-Residence
John M. Curtis	Director, International Economics Program
Yvon Gasse	Director, Small and Medium-Sized Business Program
Barbara L. Hodgins	Director, Western Resources Program
Barry Lesser	Director, Regional Employment Opportunities Program
Louis Vagianos	Acting Director, Technology and Society Program
Parker Staples	Director, Financial Services
Donald Wilson	Director, Communications
Tom Kent	Editor, *Policy Options Politiques*

PUBLICATIONS AVAILABLE - JUNE 1985

Leroy O. Stone & Claude Marceau	*Canadian Population Trends and Public Policy Through the 1980s*. 1977 $4.00
Raymond Breton	*The Canadian Condition: A Guide to Research in Public Policy*. 1977 $2.95
Raymond Breton	*Une orientation de la recherche politique dans le contexte canadien*. 1977 $2.95
J.W. Rowley & W.T. Stanbury (eds.)	*Competition Policy in Canada: Stage II, Bill C-13*. 1978 $12.95
W.E. Cundiff	*Nodule Shock? Seabed Mining and the Future of the Canadian Nickel Industry*. 1978 $3.00
C.F. Smart & W.T. Stanbury (eds.)	*Studies on Crisis Management*. 1978 $9.95

Order Address: The Institute for Research on Public Policy
P.O. Box 3670
Halifax, Nova Scotia
B3J 3K6

W.T. Stanbury (ed.)	*Studies on Regulation in Canada.* 1978 $9.95
Michael Hudson	*Canada in the New Monetary Order: Borrow? Devalue? Restructure!* 1978 $6.95
Robert A. Russel	*The Electronic Briefcase: The Office of the Future.* 1978 $3.00
C.C. Gotlieb	*Computers in the Home: What They Can Do for Us--And to Us.* 1978 $3.00
David K. Foot (ed.)	*Public Employment and Compensation in Canada: Myths and Realities.* 1978 $10.95
Raymond Breton & Gail Grant Akian	*Urban Institutions and People of Indian Ancestry: Suggestions for Research.* 1979 $3.00
K.A. J. Hay	*Friends or Acquaintances? Canada and Japan's Other Trading Partners in the Early 1980s.* 1979 $3.00
Thomas H. Atkinson	*Trends in Life Satisfaction Among Canadians, 1968-1977.* 1979 $3.00
W.E. Cundiff & Mado Reid (eds.)	*Issues in Canadian U.S. Transborder Computer Data Flows.* 1979 $6.50
David K. Foot (ed.)	*Public Employment in Canada: Statistical Series.* 1979 $15.00
Meyer W. Bucovetsky (ed.)	*Studies in Public Employment and Compensation in Canada.* 1979 $14.95
Richard French & André Béliveau	*The RCMP and the Management of National Security.* 1979 $6.95
Richard French & André Béliveau	*La GRC et la gestion de la sécurité nationale.* 1979 $6.95
Fred Thompson & W.T. Stanbury	*The Political Economy of Interest Groups in the Legislative Process in Canada.* 1979 $3.00
G. Bruce Doern & Allan M. Maslove (eds.)	*The Public Evaluation of Government Spending.* 1979 $10.95
Leroy O. Stone & Michael J. MacLean	*Future Income Prospects for Canada's Senior Citizens.* 1979 $7.95
Richard M. Bird	*The Growth of Public Employment in Canada.* 1979 $12.95
Richard Price (ed.)	*The Spirit of the Alberta Indian Treaties.* 1979 $8.95

Richard J. Schultz — *Federalism and the Regulatory Process.* 1979 $1.50

Richard J. Schultz — *Le fédéralisme et le processus de réglementation.* 1979 $1.50

Lionel D. Feldman & Katherine A. Graham — *Bargaining for Cities, Municipalities and Intergovernmental Relations: An Assessment.* 1979 $10.95

Elliot J. Feldman & Neil Nevitte (eds.) — *The Future of North America: Canada, the United States, and Quebec Nationalism.* 1979 $7.95

Pierre Sormany — *Les micro-esclaves : vers une bio-industrie canadienne.* 1979 $3.00

Maximo Halty-Carrere — *Technological Development Strategies for Developing Countries: A Review for Policy Makers.* 1979 $12.95

David R. Protheroe — *Imports and Politics: Trade Decision Making in Canada, 1968-1979.* 1980 $8.95

Zavis P. Zeman & David Hoffman (eds.) — *The Dynamics of the Technological Leadership of the World.* 1980 $3.00

G. Bruce Doern — *Government Intervention in the Canadian Nuclear Industry.* 1980 $8.95

G. Bruce Doern & Robert W. Morrison (eds.) — *Canadian Nuclear Policies.* 1980 $14.95

Russell Wilkins — *Health Status in Canada, 1926-1976.* 1980 $3.00

Russell Wilkins — *L'état de santé au Canada, 1926-1976.* 1980 $3.00

Allan M. Maslove & Gene Swimmer — *Wage Controls in Canada: 1975-78: A Study of Public Decision Making.* 1980 $11.95

T. Gregory Kane — *Consumers and the Regulators: Intervention in the Federal Regulatory Process.* 1980 $10.95

Réjean Lachapelle & Jacques Henripin — *La situation démolinguistique au Canada: évolution passée et prospective.* 1980 $24.95

Albert Breton & Anthony Scott — *The Design of Federations.* 1980 $6.95

A.R. Bailey & D.G. Hull — *The Way Out: A More Revenue-Dependent Public Sector and How It Might Revitalize the Process of Governing.* 1980 $6.95

David R. Harvey	*Christmas Turkey or Prairie Vulture? An Economic Analysis of the Crow's Nest Pass Grain Rates.* 1980 $10.95
Donald G. Cartwright	*Official Language Populations in Canada: Patterns and Contacts.* 1980 $4.95
Richard M. Bird	*Taxing Corporations.* 1980 $6.95
Leroy O. Stone & Susan Fletcher	*A Profile of Canada's Older Population.* 1980 $7.95
Peter N. Nemetz (ed.)	*Resource Policy: International Perspectives.* 1980 $18.95
Keith A. J. Hay (ed.)	*Canadian Perspectives on Economic Relations With Japan.* 1980 $18.95
Dhiru Patel	*Dealing With Interracial Conflict: Policy Alternatives.* 1980 $5.95
Raymond Breton & Gail Grant	*La langue de travail au Québec : synthèse de la recherche sur la rencontre de deux langues.* 1981 $10.95
Diane Vanasse	*L'évolution de la population scolaire du Québec.* 1981 $12.95
David M. Cameron (ed.)	*Regionalism and Supranationalism: Challenges and Alternatives to the Nation-State in Canada and Europe.* 1981 $9.95
Heather Menzies	*Women and the Chip: Case Studies of theEffects of Informatics on Employment in Canada.* 1981 $8.95
H.V. Kroeker (ed.)	*Sovereign People or Sovereign Governments.* 1981 $12.95
Peter Aucoin (ed.)	*The Politics and Management of Restraint in Government.* 1981 $17.95
Nicole S. Morgan	*Nowhere to Go? Possible Consequences of the Demographic Imbalance in Decision-Making Groups of the Federal Public Service.* 1981 $8.95
Nicole S. Morgan	*Où aller? Les conséquences prévisibles des déséquilibres démographiques chez les groupes de décision de la fonction publique fédérale.* 1981 $8.95

Raymond Breton, Jeffrey G. Reitz & Victor F. Valentine	*Les frontières culturelles et la cohésion du Canada.* 1981 $18.95
Peter N. Nemetz (ed.)	*Energy Crisis: Policy Response.* 1981 $10.95
James Gillies	*Where Business Fails.* 1981 $9.95
Robert A. Russel	*Office Automation: Key to the Information Society.* 1981 $3.00
Allan Tupper & G. Bruce Doern (eds.)	*Public Corporations and Public Policy in Canada.* 1981 $16.95
Réjean Lachapelle & Jacques Henripin	*The Demolinguistic Situation in Canada: Past Trends and Future Prospects.* 1982 $24.95
Irving Brecher	*Canada's Competition Policy Revisited: Some New Thoughts on an Old Story.* 1982 $3.00
Ian McAllister	*Regional Development and the European Community: A Canadian Perspective.* 1982 $13.95
Donald J. Daly	*Canada in an Uncertain World Economic Environment.* 1982 $3.00
W.T. Stanbury & Fred Thompson	*Regulatory Reform in Canada.* 1982 $7.95
Robert J. Buchan, C. Christopher Johnston, T. Gregory Kane, Barry Lesser, Richard J. Schultz & W.T. Stanbury	*Telecommunications Regulation and the Constitution.* 1982 $18.95
Rodney de C. Grey	*United States Trade Policy Legislation: A Canadian View.* 1982 $7.95
John Quinn & Philip Slayton (eds.)	*Non-Tariff Barriers After the Tokyo Round.* 1982 $17.95
Stanley M. Beck & Ivan Bernier (eds.)	*Canada and the New Constitution: The Unfinished Agenda.* 2 vols. 1982 $10.95
R. Brian Woodrow & Kenneth B. Woodside (eds.)	*The Introduction of Pay-TV in Canada: Issues and Implications.* 1982 $14.95
E.P. Weeks & L. Mazany	*The Future of the Atlantic Fisheries.* 1983 $5.00
Douglas D. Purvis (ed.), assisted by Frances Chambers	*The Canadian Balance of Payments: Perspectives and Policy Issues.* 1983 $24.95

Roy A. Matthews	*Canada and the "Little Dragons": An Analysis of Economic Developments in Hong Kong, Taiwan, South Korea and the Challenge/Opportunity They Present for Canadian Interests in the 1980s.* 1983 $11.95
Charles F. Doran	*Economic Interdependence, Autonomy, and Canadian-American Relations.* 1983 $5.00
Charles Pearson & Gerry Salembier	*Trade, Employment, and Adjustment.* 1983 $5.00
Steven Globerman	*Cultural Regulation in Canada.* 1983 $11.95
F.R. Flatters & R.G. Lipsey	*Common Ground for the Canadian Common Market.* 1983 $5.00
Frank Bunn, assisted by U. Domb, D. Huntley, H. Mills, H. Silverstein	*Oceans from Space: Towards the Management of Our Coastal Zones.* 1983 $5.00
C.D. Shearing & P.C. Stenning	*Private Security and Private Justice: The Challenge of the 80s.* 1983 $5.00
Jacob Finkelman & Shirley B. Goldenberg	*Collective Bargaining in the Public Service: The Federal Experience in Canada.* 2 vols. 1983 $29.95
Gail Grant	*The Concrete Reserve: Corporate Programs for Indians in the Urban Work Place.* 1983 $5.00
Roy George	*Targeting High-Growth Industry.* 1983 $5.00
Owen Adams & Russell Wilkins	*Healthfulness of Life.* 1984 $5.00
Yoshi Tsurumi with Rebecca R. Tsurumi	*Sogoshosha: Engines of Export-Based Growth* (Revised Edition). 1984 $10.95
Raymond Breton & Gail Grant	*The Dynamics of Government Programs for Urban Indians in the Prairie Provinces.* 1984 $19.95
Frank Stone	*Canada, The GATT and the International Trade System.* 1984 $15.00
Pierre Sauvé	*Private Bank Lending and Developing-Country Debt.* 1984 $10.00
Mark Thompson & Gene Swimmer	*Conflict or Compromise: The Future of Public Sector Industrial Relations.* 1984 $15.00

Samuel Wex	*Instead of FIRA: Autonomy for Canadian Subsidiaries.* 1984 $8.00
R.J. Wonnacott	*Selected New Developments in International Trade Theory.* 1984 $7.00
R.J. Wonnacott	*Aggressive US Reciprocity Evaluated with a New Analytical Approach to Trade Conflicts.* 1984 $8.00
Richard W. Wright	*Japanese Business in Canada: The Elusive Alliance.* 1984 $12.00
Paul K. Gorecki & W.T. Stanbury	*The Objectives of Canadian Competition Policy, 1888-1983.* 1984 $15.00
Michael Hart	*Some Thoughts on Canada-United States Sectoral Free Trade.* 1985 $7.00
J. Peter Meekison Roy J. Romanow & William D. Moull	*Origins and Meaning of Section 92A: The 1982 Constitutional Amendment on Resources.* 1985 $10.00
Conference Papers	*Canada and International Trade. Volume One: Major Issues of Canadian Trade Policy. Volume Two: Canada and the Pacific Rim.* 1985 $25.00 (set)
A.E. Safarian	*Foreign Direct Investment: A Survey of Canadian Research.* 1985 $8.00
Joseph R. D'Cruz & James D. Fleck	*Canada Can Compete! Strategic Management of the Canadian Industrial Portfolio.* 1985 $18.00
Barry Lesser & Louis Vagianos	*Computer Communications and the Mass Market in Canada.* 1985 $10.00
W.R. Hines	*Trade Policy Making in Canada: Are We Doing it Right?* 1985 $10.00